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THE STANDARD
HORSE
AND
STOCK BOOK

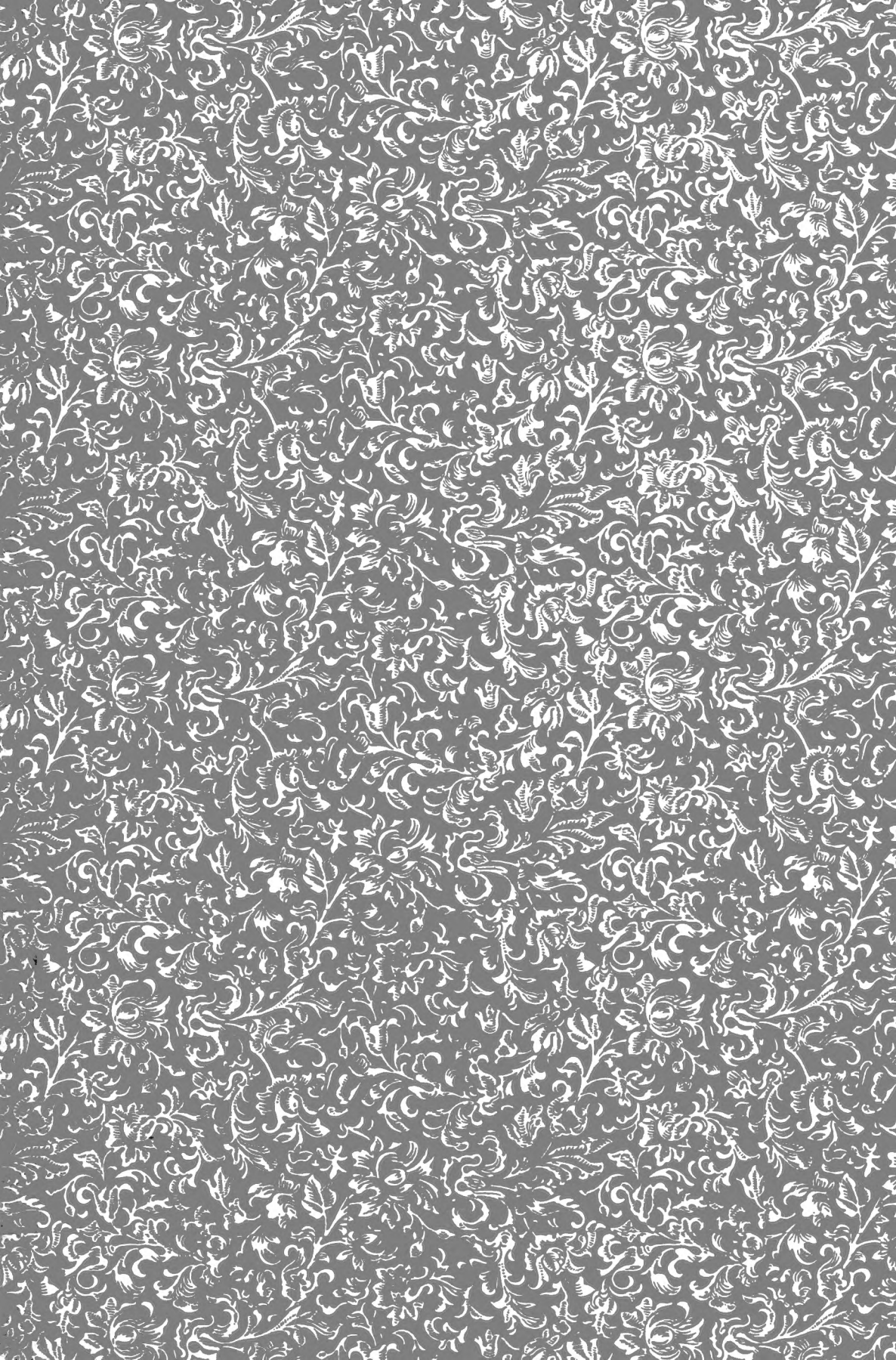


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AN INTRODUCTORY TALK

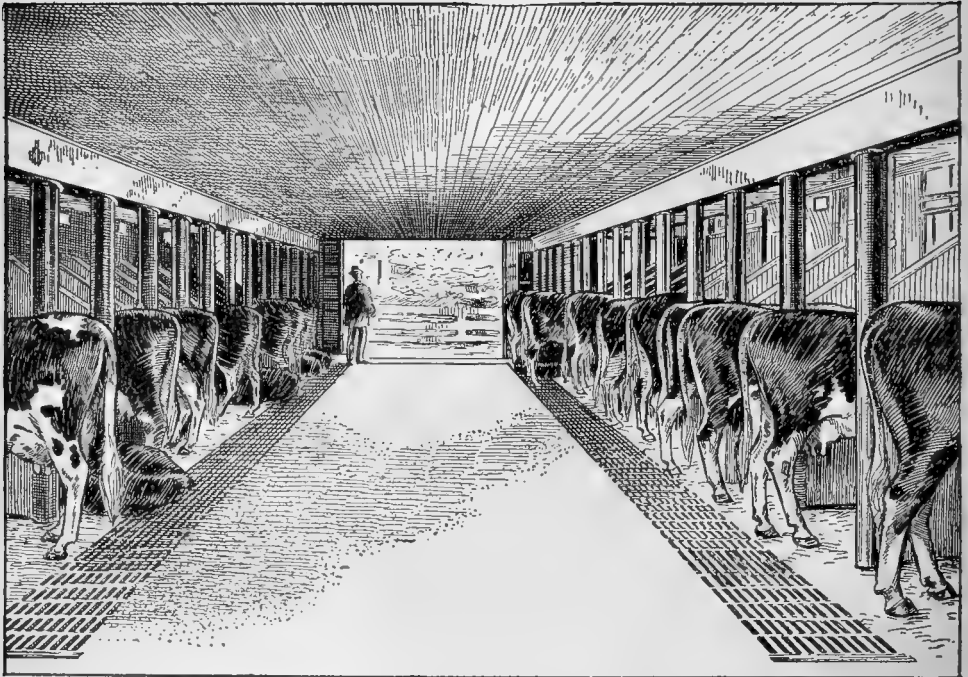
FARMING in the opening years of the 20th century is not what it was a quarter of a century ago—and every one is glad it is so.

It is no longer a chance occupation taken as a last resort. It has become a profession and also a trade. A profession in that it is successfully followed by those who recognize that underlying it are scientific principles which must be mastered and if followed lead to success and prosperity. As a trade it is recognized as a calling which can be mastered by years of apprenticeship. In any case the farmer must have his library and his journals as do all other men who work intelligently in any calling. His work is no longer *mere* muscular effort, but also brain force and energy. Hence there is a place for this book on the table and bench of every large and small farmer. Much care has been taken to get a great deal of practical and useful information into a few pages. In other words this book is a *Multum in Parvo*, or “Much in Little” book. It is the result of careful research and consideration of what the ablest authorities in this and other countries have to say on the subjects of vital importance to FARMERS and STOCK GROWERS.

This book is designed in the first place to meet the requirements of a large class of stock men and farmers who must treat their own animals when sick. Not only the most convenient and sure remedies and treatments are given, but also many illustrations are made and shown to assist one who tries to follow the descriptions. The symptoms of diseases of all kinds of stock are so carefully described that they may be easily recognized and the necessary advice is given to give immediate relief, or in turn to meet the difficulty.

This book will also be invaluable for the help it gives on the care of small animals, bees, gardens, orchards, and plant life. These subjects are not usually so well treated in the ordinary farm book.

It is recognized that the farmer's wife is his “help meet” and should have a place in this book. So several pages are devoted to her interests in the house, while her good man is busy with the farm, the barn and the stock.



A MODEL COW STABLE

ARRANGED ESPECIALLY FOR DRAINAGE AND CLEANLINESS, WITH SUFFICIENT LIGHT AND AIR FOR VENTILATION AND WITH AMPLE ROOM FOR THE PROPER MANAGEMENT OF CATTLE, AND FOR THEIR COMFORT. IN THIS WAY ONLY THE BEST RESULTS ARE OBTAINED.

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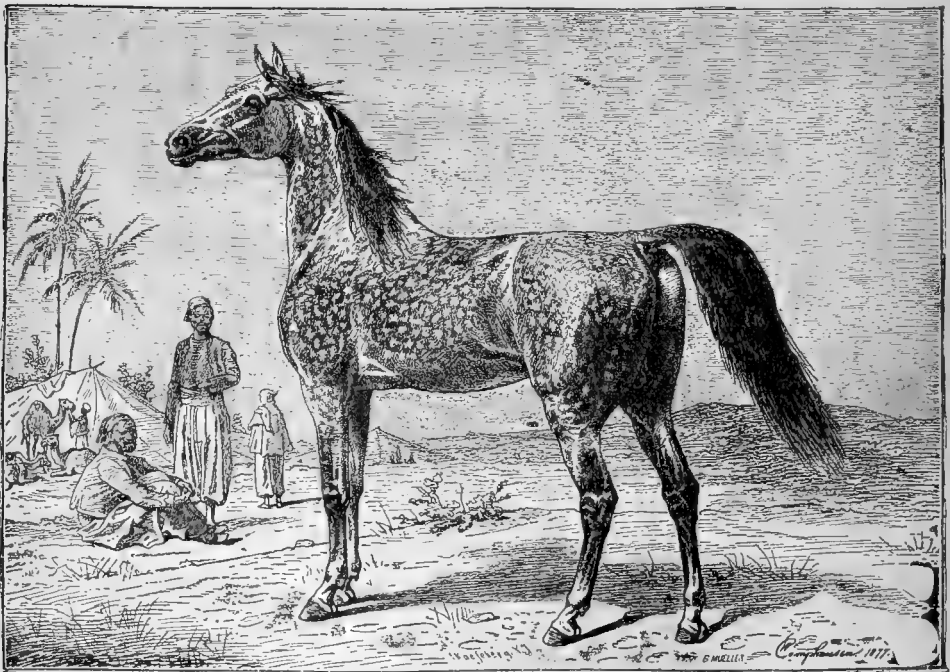
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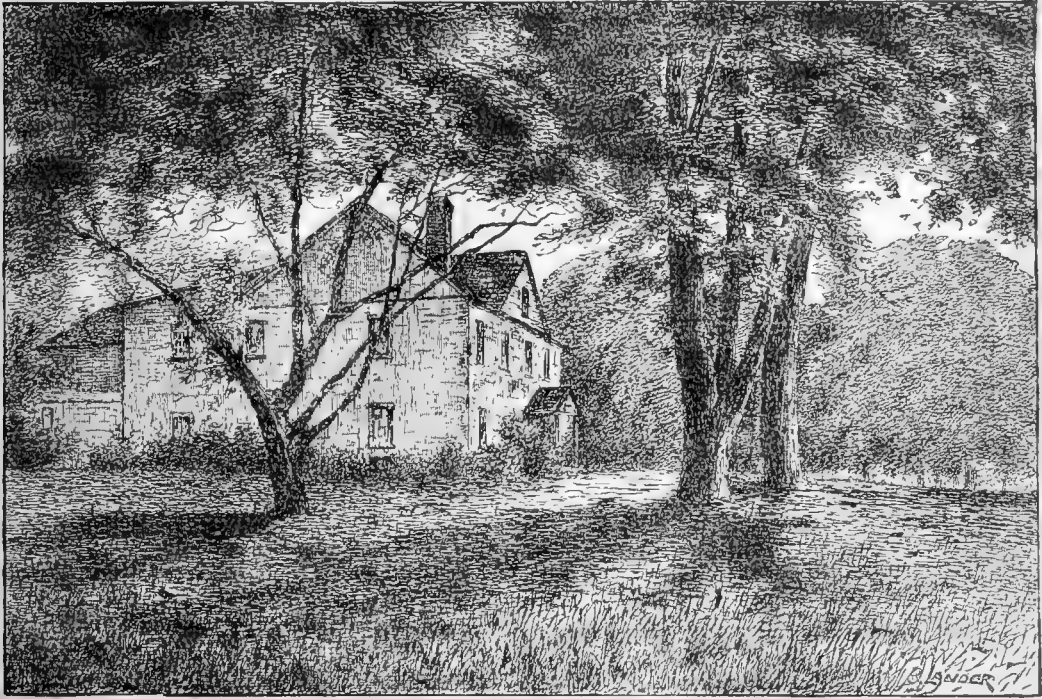


THE ARABIAN HORSE

Noted for its beauty, strength, speed and its affection for its master.

THE FRIEND OF ALL

IN AND AROUND THE HOUSE AND FARM.



Home of Emerson, Concord, Mass.

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THE desire to own one's home seems well-nigh universal; and in America an unusually large proportion of families are able to gratify that desire. Great as is the absolute number of those who dwell in cities and towns, much greater is their number who do not. And even of those who do business in cities and large towns, many prefer to reside, to "live," in the country. Steam and electricity have so lubricated the channels of communication, that a New York business man may reach his family at a home in New Jersey or on Long Island, or a Boston man may reach his in the country in almost any direction, in about the same number of minutes as he would need to take him from one part of the city to another. With the telegraph and the telephone, the goodman may promptly

and seasonably even notify the good-woman of an unexpected guest. And a home with ground for garden and lawn can be bought for the price of a small tenement on a city lot or less. A little way from the village or the railway station, a few acres of ground on which a horse and cow may be kept, and where the proceeds of the land may be made to go far toward the payment of the necessary hired help, are quite within the means of multitudes even of those who must do business "in town." And there is a perennial fascination in planning and building one's own dwelling and home. Not unfrequently this fascination draws to new enterprises as fast as the old are successfully achieved; and the finished home is sold that its projector may again feel the delight of drawing, arranging and overseeing.

THE ARCHITECT.

There are many things that a beginner ought to learn in a less expensive school than experience. One is, the employment of a good architect. How many ill-contrived, inconvenient, unhealthy, ugly-looking houses does one see, the result of the unassisted inexperience of the owner and the carpenter; where a competent architect could have achieved a result every way satisfactory, with the same or even a smaller outlay. Of course, there are architects and architects, and a projector ought not blindly to trust to the first name he sees with the word architect painted or printed after it, the designing and building his home, any more than he would trust his own or his family's health to an unknown physician, or his pecuniary interests to the first chance lawyer. But there have been such late improvements in architecture and building, and the subject has attracted so large a mass of really superior talent and education, that an approximately right man can with no great difficulty be found. With such a man the whole subject should be discussed at the outset, if possible even before the selection of the site, that the entire enterprise may be harmoniously wrought out, on a well-matured plan, and in a thorough, conscientious and every way workman-like manner.

SITE AND DRAINAGE.

Other things being satisfactory, high ground, from which the water runs in every direction, should have the preference. Avoid clay formations, which leave basins underground, and prevent the escape of surplus water. Next best is a side hill, the ground above being so graded as to throw off the water which otherwise might descend upon you. In any case, the greatest pains should be taken to secure perfect drainage. Many a husband and father, many a wife and mother, have fallen victims to ignorance, neglect or mistake of some kind in this paramount matter. Every part of the house and its areas should be thoroughly drained, and in such a manner that the waste matter may not settle and fester anywhere on its road. Where a small river or stream receives the ground drainage, a drain must be laid for the sewage, and this should be received in a cesspool or vault under ground, as otherwise the water may become poisoned. The pipes should be laid three to four feet below the surface, where they will not be affected by frost. Too large pipes are liable to retain the flow of water and become clogged. In the country, where there is no sewerage system, the sewage must be confined to the estate, and the use of earth-closets for solid matter is to be recommended. Fluids must be carried away from the

house to a tank water-tight, underneath the ground, and may be used in irrigation.

All cesspools and sewers should be ventilated, as the gases there formed will force their way back into the house unless some outlet be given them. All traps should be ventilated. This is now usually accomplished by a pipe leading up to the roof, and protected by a cap from downward draught. There must always be an inlet of pure fresh air to supply the place of that rising off. Areas need draining. Wash-sinks and closets should never be put in the basement unless the cesspool into which they drain be much lower, so that there shall be a decided fall. Otherwise the drainage is liable to stagnate, and the gases to back up and force their way in. Soil-pipes should be most carefully laid on a solid bottom, so that no settling can affect the joints. Vitrified stone-ware pipes are considered the best. Iron pipes are difficult to repair. The cement pipe, though it joins well, has a rough surface upon the inside, and to this matter will adhere.

EXPOSURE.

The direction in which the house faces has much to do with the comfort of its inmates. Two things are to be considered: the prevailing wind, and the sun. Houses are often set so that they exclude the cool breezes in summer, and have the full force of the cold winds in winter.

WATER.

The water-supply is a matter of the first importance. Generally, a country-house has to be supplied from a tank in the roof, and the water from this tank should pass through an efficient filter as it is used. Where pure soft water can be led into this tank from a neighboring hill or other sufficient height, that is by all means the best way. Where water cannot be thus procured, often a hydraulic ram placed in a running stream near by may be made to feed the tank. Perhaps the water must be raised from a well, or from a cistern which receives the rain-water. A force-pump easily does the work, and where no other power is at hand, a wind-mill may be employed. But a wind-mill in sight, at rest or in motion, is hardly an æsthetic addition to the landscape. If the tank is large enough, and on sufficient foundations, the rain-water may be received directly into it and the labor of raising it economized. Don't use impure or "hard" water if you can help it, even if it is to be filtered.

In the matter of drainage and of water, residents of cities, where the sewerage is well constructed, have a decided advantage. The sewers being below the houses, and generally an abundance of pure water "on tap" day and night, in a modern well-built city home, ventilated by

pipes from subcellar to roof, the tendency of any malaria is towards, and not from, the ventilating pipes. The forty-five-mile layer of air, in the bottom scale of which we live, constantly receives the exhaled waste, and as constantly divine chemistry reconverts this waste into healthful forms, ready for vitality again to assimilate.

CELLAR.

A side hill is of advantage when the slope is sufficient to have one side of the cellar above ground. If a cellar built in this way is to be used as kitchen or laundry, it is always best to have a subcellar.

No living-room should have its floor set directly upon the ground, but there should always be a circulation of air between the ground and the floor, even if the ground be dry.

The cellar is not unfrequently an expensive part of house-building, but it is certainly a very important part, as are all foundations. Dressed stone is the best for the underpinning. The squares of stone need not be of uniform size. Rubble-work, an imitation of granite, is often employed, and is less expensive. With a composition of cement and sand, colored with Venetian red, Spanish brown and lamp-black, the rough edges of the stone are pointed so that if the lines are horizontal and plumb the result will be a close imitation of the jointed masonry.

CHIMNEYS.

Chimneys may be made so as to add greatly to the effect of the house. They should be large enough to give the idea of strength and solidity. The color should be carefully chosen. Chimneys carried upon the outside admit of good treatment. Those so built should have an air-chamber or space between the flues and outer walls which will prevent their becoming chilled, and there will be no trouble about the draught. No timbers should be extended into flues.

The foundations of chimneys should be carefully laid, as they are liable to settle owing to their weight.

FRAMING.

Sound and well-seasoned timber should be selected. Avoid resting the frame on girders or interties. The sill should be laid flat, which reduces the shrinkage. This method distributes the weight over the foundation. Then the posts and studs are run continuously up to the roof. Instead of having thirty or forty inches of timber across the grain, there are only the sill and plate which are laid flat, and there is little chance for shrinking. Timber shrinks across the grain, not lengthwise. Lathing should not be laid immediately on the under side of floor-beams, which are apt to shrink.

ROOFS.

The roofing should be carefully done, and the covering for the framework closely joined, leaving no chance for rain and sun to penetrate. It is a good plan to inclose the walls before roofing. Where the roof is flat, or nearly so, tin roofs are generally used. The plates must be laid with great care, and well soldered, or there will be small leaks, troublesome to find and troublesome to stop. The tin plates must be thoroughly painted, freely using what are called "paint-skins," and the work carefully examined when first tested with heavy rain, or melting snow. And great care should be taken about stepping on a tin roof, as a little carelessness with heavy nailed boots may cause a deal of trouble. Cheaper substitutes for tin are much used, however, on flat or nearly flat roofs. These are made of some kind of cement or roofing spread over while hot, and covered before drying with large gravel or small pebbles. Some of these do exceedingly good service, and do not cost nearly as much as a good tin roof.

But it is better, where the surroundings admit, that a roof should have pitch enough to admit of a shingle or a slate roof. Especially where heavy snows are to be expected, is such a roof to be preferred, as the melting snow passes easily off, and the necessity for shoveling, so often needed with a flat roof, is obviated. Good slates are to be had from Vermont, Pennsylvania and Virginia, and properly laid on form a fine and durable roof, though of course one more expensive than shingles. The slates absorb no dampness, and need no slats, and laid with felting between the sheathing and them, form a firm barrier against cold and heat, and especially snow. If shingles are used, the split ones are better than the sawn, though dearer, the grain running the length of the shingle. And if the beautiful neutral tint which a shingle roof soon takes on with exposure to the weather is not good enough, pray do not paint your roof some glaring, offensive color that shall vex the onlooking eye, but use a stain or dye that shall harmonize with its surroundings.

WINDOWS.

With the Queen Anne style of building, the small windows and little panes have come into considerable favor. Small panes are not suitable for rooms in general use. Fine plate glass is immensely superior to the glass of the Queen Anne time, and it seems absurd to obstruct a beautiful view by the sash-ribs which in those days were a necessity. Broad low windows are a delight to the inmates of a house, and should be placed in the living-rooms. The introduction of stained glass is very acceptable in places where it may

be used appropriately. A staircase may be very well lighted with a high stained-glass window. Leaded panes of glass in the hall-door are pleasant, and in the fan-lights. The glass generally used for these purposes is known as cathedral-roll, which has an uneven surface and brilliant effect.

BLINDS.

Outside blinds to a frame house are convenient in some respects, and in others quite the reverse. For stone and brick houses inside shutters are usually made, as the thick walls offer the required depth to fold the shutters back against. Where there are bay-windows or a group of windows, either inside or outside blinds interfere. An architect has contrived a way of letting the shutter slide down out of sight, something after the manner of a car-blind. This certainly is an improvement, as the hangings or shades are not interfered with, and the rather unsightly shutter is well out of the way during a great part of the time. Venetian shades or rolling blinds are not much used, as they are expensive and are a protection only against sun and light. Hoods are a great protection and ornament over doors and windows. Where a porch is made, or balcony, a hood-covering, with sides which come to the steps or front, is very effective.

DOORS.

Entrance-doors should be wide, and preferably in two leaves. Large pieces of furniture, trunks, etc., usually have to go in at the front door. If possible, have inner or vestibule doors. The outer doors should have small glass windows to light the vestibule. The vestibule door should be partly of glass. In the city, within two years, there has been a sort of front-door "revival." Many houses have had the old doors taken down to make way for those of improved design, with more carving in the solid wood and less cheap ornament applied, and fewer veneered panels imitating fine wood. In country building the front door is happily not such an all-important feature, and with improved cottage-building comes the suitable doorway and door.

HALL.

A long narrow hall does not impress one as pleasantly as a broad or square entry. If the entry be like a room, a settee or sofa may be placed in it, perhaps several chairs. In some of the Queen Anne cottages a fire-place is made in the entry, and this is certainly very appropriate, and gives one a feeling of comfort immediately upon entering. Never have the entry dark. A hat-tree is rather ugly and not very useful. An umbrella-stand will hold the sticks and umbrellas quite as well, and a hat-mirror with a few hooks

will take the place of the rack. A table placed near the door is very convenient for hats, cards, parcels, etc. There should be closets somewhere in the entry where the people of the house can bestow their coats and wraps. If a wood floor is laid in the entry it can be very easily kept clean, and if a rug be put down over the part used the objection of noise will be overcome, besides adding much to the home-look.

STAIRWAYS.

Stairs should be broad and low, and the staircase, if possible, broken with a landing where the stairs turn. The general habit of building staircases which resemble ladders ought to be done away with as fast as possible. A back stairway is a great advantage, too often left out of the house-plan. No houses but those of tiny proportions should be without a second stairway.

ATTIC.

In country houses there is usually an attic, so that the trials of living without a trunk- and store-room are not known. In the city many houses of good style and well built are minus such a luxury as a store-room, or at best have one small dark closet dignified by the name.

CLOSETS.

One of the great advantages of the Queen Anne cottages is the numberless places which are left to be used as closets and cupboards. Of these there can never be too many, and often a little ingenuity will produce a small recess where there was some clumsy bit of wall, and this can be fitted up with shelves, drawers or hooks. Builders are not as a rule careful about these small but most important parts of house-making. Never grudge ample room for dining-room and kitchen pantries, for the most modest establishment requires a good deal of room in which to spread out. The pantry or room adjoining the kitchen should have plenty of shelves, the lowest one broad, and under that there should be a place for flour-barrels, with inclosed sides, and a square place cut above and hinged so that the flour can be quickly taken out. Cupboards for sugar-buckets, etc., should also be made. The broad shelf will be about the height of a table, and make an excellent place for preparing food, rolling pastry, etc. The dining-room or butler's pantry should have a sink and water-faucets, hot and cold if there is a range with hot-water boiler.

HEATING HOUSES.

Furnace-heat is a great convenience, though even with the best furnaces, carefully managed, the air is apt to be dry. Steam is pleasanter,

but expensive. Stoves are ugly and troublesome, but will probably be used for a long time to come, as they are cheap and give a good deal of heat for the fuel. The Baltimore heaters are good where there is a chimney in which one can be set. They are not very expensive, are economical of fuel, easily managed, and will heat two or three rooms by the pipes which run up in the chimney to the floors above, where registers are placed. These heaters with the improvements are much used. But all who can should have an open wood-fire in the living-room if in no other place. The heat from such a fire does not parch the skin and make the head ache. It is healthful, and an open fire is one of the most cheering things in the world. A good furnace kept so that the entries and halls will be comfortably heated, and open fires either of wood or soft coal in the living-rooms, are the most satisfactory ways of heating either city or country houses.

People are slow to realize how perfect a ventilator an open fire-place is, and in sleeping-rooms though bringing no draughts of air to inmates, it gives free escape for impure air. An open fire in sickness is of great use. Whether furnaces or stoves are used, water should be kept constantly evaporating. Carelessness in this respect, especially with the usual furnace, is likely to cause distressing headaches.

Wooden mantel-pieces with shelves are now much used in place of marbelized slate and marble.

TILES.

Do not overlook the pleasure which the use of artistic and well-made tiles can afford to the inmates of your house. When chimney and hearth had to be thus ornamented entirely by unassisted hand-labor, the expense was often prohibitive. Now that machinery has been organized to do this so well and so cheaply, and so much talent has been allured into the design and the executing of tile-work, this ornamentation is within the reach of all. There is at Chelsea, Mass., the Art Tile Works of Messrs. J. & J. G. Low, an examination of whose productions fills one with an ever varied and always deepening pleasure. Messrs. Low have succeeded in giving an entirely new value to tiles, especially in regard to color and what we may call texture. By their processes tiles are not only modeled in relief, but are most beautifully graded in color, a blush of a certain tone seeming to spread and deepen over the surface, and while a certain grade of color is adhered to in a number of tiles, no two are alike in the distribution of values, and the surface is apparently a thin glaze overlying a mellow molten depth. To this description of tiles has lately been added another still more

effective, in which various colors are used in the same piece, and in which are seen curious crystalline formations of great brilliancy under the transparent surface. The beauties and novelties of these tiles are as impossible to convey in black-and-white illustrations as are those of the opalescent glass now so deservedly admired, and which has added a new charm and larger range to the effect of our stained glass.

CEILINGS AND WALLS.

In the furnishing of rooms in country houses, white and red pine well seasoned will be found cheap and satisfactory as a trimming. This wood is reliable if well selected, and endures changes in temperature better than most other wood. The pine should not be painted, as that hides its grain. It should be treated with shellac and copal varnish. The dining-room is appropriately finished with a high wooden wainscot. The buffet can easily be made to form part of it. A frieze of wood with wooden ceiling is very pretty and in good keeping. Certain combinations of color will have an enlivening effect; others a depressing. In choosing the colors for a room, reference should be had to the size, light admitted and use. Blue produces the effect of distance, and where the ceiling is too low may be well used, as it will give an impression of height. Yellow seems to advance towards the eye, so if used will make a moulding more prominent, or the ceiling seem lower. Blue is restful to the eye, but in a north room is a little cool, especially for the winter season. Most artists assert that with dark walls furniture and costumes show to better advantage, while pictures look better upon a light background.

For gilt frames olive, gray and deep green are appropriate. Engravings and etchings with simple frames look well against a dark maroon. If the trimmings of a house or room are painted darker than the body or main part, the effect of strength is added. The framework of a door should be darker than the panels. The same may be said of cornices and windows: the frame part should give the look of strength. A good rule for color on the walls is to have the richer colors low down, while the light colors should be put near or on the ceiling. Papers are easily procured and are not costly, while fine decorating is very expensive and not easy to be had. Ceilings may be papered, but require care in selection of suitable papers to harmonize with the wall-paper. The extent of wall is often broken up by the use of frieze and dado, with very good results. The friezes are sometimes very elaborate and beautiful, but large designs should be avoided in small low-ceiled rooms.

FURNITURE.

All the furniture should be honest, by which we mean it should be well put together, the wood properly dressed, and there should be no superfluous scrolls and ledges, which are tiresome to the eye, out of place, and excellent traps for dust.

Of cheap furniture there is enough to stock a new world, so to speak, in our cities. It is turned out in quantities from large factories, half-seasoned wood being used, and the result is a half-finished set of furniture of bad design—bureau-drawers that soon shrink so that they will not close, and tables that crack across the top. These, surely, are not good investments even though they are cheap. Thoroughly made furniture will pay in the end. For upholstered furniture choose stuffs which are suitable to the room in which the pieces are to be put, and also keep in mind the colors of the walls and carpet. The Wakefield Rattan furniture is much used and liked now. Chairs of this material, with cushioned seats, can be had very reasonably, which in real comfort will far outdo the so-called "easy chairs" of the ordinary upholsterer. This furniture is well suited to country houses.

OUTSIDE COLORS.

A frame house painted white, the shutters painted green, and so dazzling in a July sun that the traveler has to shield his eyes, has until quite recently been the outside aspect of the country home. Happily now a taste is forming for pleasant neutral tints which are much more satisfactory in all ways. The seaside houses have made a great step towards improvement, but inland, away from watering-places and suburban villas, white paint is still master of the situation. The best time for painting the outside of buildings is in the late autumn. The paint then dries slowly, and the surface becomes hard, not affected by weather.

PICTURES.

These make a great item in the means of education, comfort and ornament in the home. As the tastes and the means of people differ in a practically endless variety, so representations on paper or canvas, addressed to the eye, vary as widely. Before the discovery of utilizing the rays of the sun to reproduce desired objects, and the modern improvements in engraving and printing, most men had to be content with few or no pictorial representations on their walls. Michelangelo Buonarroti and his fellows busied themselves greatly with frescoes, and visits to various places were necessary to an appreciation of their wonderful work. A copy even of a celebrated painting was very costly, and fell short of the

model; as the copyer fell short of the original painter. The works of Michelangelo, Rubens, Raphael, Leonardo da Vinci, Domenichino, Caravaggio, Guido, Poussin, Claude Lorraine, Murillo, Velasquez, Van Dyck, Teniers, Rembrandt, and an almost countless host of brother-artists, were a sealed book to the great majority. But the best of them were early produced in engravings, approximately like the originals, whose price soon began to popularize the masterpieces. These, however, necessarily shared in the imperfection of the engravers who wrought them, and in the transfer often a part, sometimes a large part, of their characteristic peculiarities disappeared.

But the invention of Niepce and Daguerre, which the latter alone, after the death of the former, made a success in 1839, and the further improvements for which that opened the way, have put a new face on the matter. Now sun-pictures, of one name and another, absolutely accurate in all except color, reproduce the work of the great masters at a price which brings them within the reach of thousands, where tens only could before be gratified. At less than the cost of a trip to their habitats, one can buy photographs and heliotypes of almost every painting of reputation in the world. A man or woman, who has never stirred from his or her native country in America, can thus form and mature an acquaintance with great artists and their works, otherwise impossible during the travel of a lifetime. Even the frescoes of great masters can be laid side by side, and studied, in their "counterfeit presentments," as the originals cannot.

Another popularizer of works of art is the chromo, that wonderful development, by which pictures can be reproduced, of a size to hang upon the wall, and with practically unlimited resources of color. These, of varying degrees of excellence or vileness, are purchasable at all times, at an insignificant price. In how many homes have not Tait's Chickens come, to moult and mature into other and larger forms of grace! No one, hardly the navy, need live with bare walls. The great paintings themselves will never come within the reach of short purses. For a sight of these, most of us must be content with an occasional visit to some private or public gallery, or an evening at a loan exhibition. Happily, their possessors are generally more than willing that the public should share in their enjoyment.

Put pictures on your walls: the best you can select and afford. Get them one or two at a time, as they make a special appeal to your individuality. Don't buy because somebody else says you *ought* to like a picture; and don't be bluffed out of what you are sure you do want because somebody else tells you, you should not.

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SOUPS.

Stock for Soups.—Take lean beef and cold water in the proportion of one pound of beef to one quart of water, and place in a soup-kettle over the fire; when it boils add one cup of cold water; remove the scum; then place over a moderate fire and let it slowly simmer four or five hours. This stock may be used for any soup in which meat-broth is desired. It may be thickened with barley, rice, macaroni or vermicelli, or by adding canned tomatoes and serving with small cubes of toasted bread.

Tomato Soup.—One quart tomatoes; boil half an hour with two quarts of water; rub through a colander; add salt and pepper to taste; rub together a large tablespoonful of butter and a tablespoonful of flour or farina, then add a little water, and stir into the soup; let it boil up, and then serve. Canned tomatoes may be used for this soup, and it can be made at the shortest notice.

Pea Soup No. 1.—Soak one quart dried split peas in water over night; in the morning drain them and add three quarts of water and one pound of salt pork; boil slowly four or five hours; add salt and pepper. Season with celery if you like.

Pea Soup No. 2.—Beef three pounds, water five quarts, six large carrots, six good turnips, three large onions, salt sufficient; put it on a good slow fire, let it boil three hours, then strain all the broth from meat and vegetables, and then add three pounds of split peas to the broth; set it on a slow fire for two hours, stirring often, so that all the peas will dissolve; take one pound fresh sausage-meat, fried to a crisp, and fried bread-crumbs; put all together, add a few fine herbs, and serve hot.

Economical Soup.—Put into a saucepan one pound pieces of stale bread, three large onions sliced, a small cabbage cut fine, a carrot and turnip, and a small head of celery (or the remains of any cold vegetables), a tablespoonful of salt, a tablespoonful of pepper, a bunch of parsley, a sprig of marjoram and thyme. Put these into two quarts of any weak stock (the liquor in which mutton has been boiled will do), and let them boil for two hours; rub through a fine hair-sieve, add a pint of new milk, boil up, and serve at once.

Macaroni Soup.—Four pounds of lean beef, four quarts of water, carrot, turnip, onions; set it for four hours till all mix together; strain it all through a sieve; have two pounds of macaroni broken into pieces one inch long; put all into a saucepan together, and let it boil for ten minutes, and serve hot.

Vermicelli Soup.—Take four pounds of lamb,

removing all the fat, one pound of veal, a slice of corned ham, and five quarts of water. Cut up the meat, put in a quart of water, and let it heat very gradually, all the while closely covered. In an hour add four quarts of boiling water, and cook till the meat is in shreds. Season with salt, sweet herbs, a little Worcestershire sauce, boil in the soup ten minutes, strain, and put back on the fire. Then add a third of a pound of vermicelli which has been boiled in clear water till tender. Boil up once, and serve.

Oyster Soup.—To each dozen or dish of oysters put half pint of water, milk one gill, butter half ounce, powdered crackers to thicken; bring the oysters and water to a boil, then add the other ingredients previously mixed together, and boil from three to five minutes only. Season with pepper and salt to taste.

Clam Soup.—For fifty clams take two tablespoonfuls of butter, one quart of milk and a half pint of water. Drain off the clam-liquor and put over the fire with a few peppercorns, some cayenne pods, and a little mace and salt. Let it boil ten minutes, put in the clams and boil half an hour, keeping the pot closely covered; then add the milk, previously heated to scalding, not boiling, in another vessel. Boil up again, and add the butter, being careful the soup does not burn. Serve without delay.

Potato Soup.—Peel a small measure of potatoes, boil till soft with a small piece of celery and two or three peppercorns in salted water; strain through a colander; add a small piece of butter.

FISH.

Fish to be **BOILED** should be put into cold water, sewed in a cloth if you have no fish-kettle. Boil until the bones can be easily removed. It should be served with drawn butter and capers.

Fish to be **FRIED** should be rolled in flour, meal or cracker-crumbs before being put into the hot lard; butter or salt pork.

Fish to be **BAKED** should be stuffed and sewed up, then laid in a pan with a little water and a few slices of salt pork under and around the fish. Blue-fish, bass, cod and shad are suitable for baking.

Fish Chowder.—Have the fish cut into steaks, and a quarter pound of fat salt pork chopped. Place with some slices of onion in a saucepan or kettle, and when browned have four potatoes sliced; lay a slice of fish upon the pork and onions, then potatoes, then fish, until all is in, when it should boil thirty minutes in three quarts of water. Soda-crackers should be soaked in one pint milk, and when the chowder is almost done pour them into it.

Stewed Oysters.—Three quarts oysters well drained; boil the liquor and skim it; add one

quart milk, half dozen Boston crackers rolled fine, pepper and salt if needed. Let it come to a boil, and then put in the oysters and boil for two or three minutes. Add a bit of butter before the stew is served.

Fried Oysters.—The oysters should be drained and laid upon a cloth. Dip each oyster in beaten egg and then in pounded cracker or corn-meal; then fry in butter and lard mixed.

Scalloped Oysters.—Oysters should be laid in a buttered pan with a thin layer of pounded cracker, then a layer of oysters, and so on till the dish is full. Season with pepper, mace, a tumbler full of the liquor, a little Sherry wine, or more of the liquor poured over the dish; then bake in a quick oven.

Clam Fritters.—Take a dozen clams cut small, a pint of milk and three eggs. Add the liquor from the clams to the milk; beat up the eggs and put in with salt and pepper, and flour enough for thin batter; then put in the chopped clams. Fry quickly in hot lard. A tablespoonful will make a fritter.

Or, dip the whole clams in batter, and fry in the same way.

Clam Chowder.—Fry a few slices of fat pork crisp, and chop to pieces. Put some of these in the bottom of a pot, and on them a layer of clams; sprinkle on pepper and salt and plenty of butter; then put in a layer of chopped onions, and then one of crackers split and wet in milk, then a little of the fat in which the pork was fried. Then a new succession in the same way, until the pot is nearly full. Cover with water, keep closely covered, and boil three quarters of an hour. Drain off the liquor, put the chowder into the tureen, and the liquor again into the pot. Thicken this liquor with flour or pounded crackers; add catsup, wine or spice to your taste, and pour this gravy over the chowder in the tureen. Pickled walnuts or butternuts go well with it.

Oyster Pie.—With a rich puff-paste of the usual thickness line a pudding-dish, and fill with crusts of dry bread or crackers, or a folded towel. Make the top crust or cover of this mock-pie very thick, heavily ornament the edges, and butter the edges of the dish so that this heavy lid may be easily lifted off. Then bake. Cook the oysters as for a stew, but put in two eggs, and a spoonful of cracker-crumbs or flour. Stew them about five minutes just before the pie is baked enough. Lift the top crust, remove the towel or other temporary contents, pour in the smoking oysters, and serve hot.

Or, make a rich oyster stew, put in a baking-dish and cover with puff-paste, and bake half an hour in a moderate oven. On this plan the oysters bake as long as the crust, and of course are not as good as on the other plan.

Pickled Oysters.—Take one hundred large oysters, a pint of white-wine vinegar, some mace, peppers and cloves, and a large red pepper. Put the oysters, with their liquor, into a porcelain kettle, salt to taste, and heat slowly till the oysters nearly boil. Take out the oysters with a skimmer, and let them cool in a jar. Add the vinegar and spices to the liquor remaining in the kettle. Let them fairly boil, and pour, scalding hot, over the nearly cold oysters. Cover the jar in which you have put them, and set away in a cool place. Next day put the contents into glass jars with tight tops, and keep them cool and dark.

Lobster.—If you are to boil your own, take a lively one, not too large, see that his claws are well tied, and pop him into a pot of boiling water into which you have put a handful of salt. He may not like it at first, but will soon lie still. Keep him till he turns the regulation red, and lay him, face down, in a sieve. When dry and cold, split open the body and tail, and crack the claws to get the meat. Reject the "lady-fingers" and the head. Eat with Durkee's or some other good dressing.

For Lobster Salad, see under Entrées.

MEATS.

Fresh meats should be put into boiling water except for soups, when the water should be cold.

Salt meats should be thoroughly washed and put into cold water.

Boiled meat is better for being left in the water in which it has been boiled till cold.

Beef Boiled.—The round is the best boiling piece. Put the meat in the pot, with water enough to cover it; let it boil very slow at first—this is the great secret of making it tender; take off the scum as it rises. From two to three hours, according to size, is the rule for boiling.

Roast Beef.—The sirloin is considered the best for roasting. Spit the meat, pepper the top, and baste it well while roasting with its own dripping, and throw on a handful of salt. When the smoke draws to the fire, it is near enough; keep the fire bright and clear. From fifteen to twenty minutes to the pound is the rule for roasting.

Beef Steak.—The inside of the sirloin makes the best steak; cut about three quarters of an inch thick. Have the gridiron hot, put on the meat and set it over a good fire of coals; turn them often. From eight to ten minutes is the rule for broiling.

Beef Steak with Onions.—Prepare a rump steak by pounding it till quite tender; season with salt, pepper and fresh butter. Put in the steak and fry it; when brown on one side turn it over; do not let it scorch. When nicely done

take it up, put a little flour over the steak, then add gradually a cup of hot water, seasoned with more salt and pepper, if necessary; then put the water over the fire and boil again, and pour over the steak.

Peel two dozen onions; put them on to boil with about two quarts of water an hour before the steak is put on to fry. When the steak is done, cut them up, put them in the frying-pan, season well with salt, pepper and butter, sprinkle with flour, stir all well together, place over the fire; stir often to prevent scorching; when they are a little brown and soft, turn them over the steak.

Mutton Roast.—The loin, haunch and saddle of mutton and lamb must be done the same as beef. All other parts must be roasted with a quick, clear fire; baste it when you put it down, and dredge it with a little flour just before you take it up. A leg of mutton of six pounds will require one hour to roast before a quick fire.

Mutton Haricot.—Take a loin of mutton, cut it into small chops, season it with ground pepper, allspice and salt, let it stand a night, and then fry it. Have good gravy well seasoned with flour, butter, catsup and pepper, if necessary. Boil turnips and carrots, cut them small, and add to the mutton stewed in the gravy, with the yolks of hard-boiled eggs, and forced-meat-balls.

Pork Roast.—Take a leg of pork and wash it clean; cut the skin in squares; make a stuffing of grated bread, sage, onion, pepper and salt, moistened with the yolk of an egg. Put this under the skin of the knuckle, and sprinkle a little powdered sage into the rind where it is cut; rub the whole surface of the skin over with a feather dipped in sweet-oil. Eight pounds will require about three hours to roast it.

The **SHOULDER, LOIN or CHINE, and SPARE-RIB** are roasted in the same manner.

Saddle of Venison Roast.—The saddle is the best piece for a small roast. Soak in water over night; remove all the skins. Insert small pieces of pork, then wrap the piece in a cloth saturated with vinegar, and set away for a day. Lay some slices of salt pork in the pan with some dry bread-crusts, salt the meat thoroughly and put into the pan, add a little water, half a cup of cream, baste very often, and roast in a quick oven.

Veal Roast.—Pursue about the same course as in roasting pork. Roast before a brisk fire till it comes to a brown color; then lay it down, baste it well with good butter and, when near done, with a little flour.

Fresh Meat.—TO KEEP A WEEK OR TWO IN SUMMER.—Farmers or others living at a distance from butchers can keep fresh meat very nicely for a week or two by putting it into sour milk

or butter-milk, placing it in a cool cellar. The bone or fat need not be removed. Rinse well when used. In cooking, four pounds of beef lose one pound by boiling, one pound five ounces by roasting, and one pound three ounces by baking; four pounds of mutton lose fourteen ounces by boiling, one pound six ounces by roasting, and one pound four ounces by baking.

To Pickle Meat in One Day.—Get a tub nearly full of rain or other soft water, put two pieces of thin wood across it and set the beef on them at about the distance of one inch from the water. Heap as much salt as will stand on the beef and let it remain twenty-four hours, then take off the beef and boil it, and you will find it is completely impregnated by the salt, the water having drawn it through the meat.

POULTRY.

Stuffing, Seasoning for.—One pound of salt, dried and sifted, half an ounce of ground white pepper, two ounces of dried thyme, one ounce of dried marjoram, and one ounce of nutmeg. When this seasoning is used, parsley only is required to be chopped in sufficient quantity to make the stuffing green. The proportions are: a half pound of bread-crumbs, three eggs, a quarter pound of suet, a half ounce of seasoning, and the peel of half a lemon grated.

Turkey Boiled.—Clean the turkey, fill the crop with stuffing, and sew it up. Put it over the fire in water enough to cover it; let it boil slowly; take off all the scum. When this is done, it should only simmer till it is done. Put a little salt into the water, and dredge the turkey in flour before boiling.

Turkey Roast.—A good-sized turkey should be roasted two and a half or three hours—very slowly at first. If you wish to make plain stuffing, pound a cracker or crumble some bread very fine, chop some raw salt pork very fine, sift some sage (and summer savory or sweet marjoram, if you have them in the house and fancy them), and mould them all together, seasoned with a little pepper. An egg worked in makes the stuffing cut better.

Turkey Hashed.—Take meat from boiled fowls, chop fine, put in saucepan, with seasoning to suit taste. Serve on toast.

Chicken Boiled.—A chicken should be boiled the same as a turkey, only it will take less time—about thirty-five minutes is sufficient. Use the same stuffing, if any, and serve up with parsley or egg-sauce.

Chicken Broiled.—Slit them down the back and season with pepper and salt; lay them on a clear fire of coals, the inside next the fire till half done, then turn and broil to a fine brown color. Broil about thirty-five minutes.

Chickens Fricassee.—Take two large young chickens, cut in small pieces, put in cold water for one hour to take all the blood out, then put in saucepan to parboil for half an hour, then take from saucepan, drained well, have ready one quart good fresh cream, two ounces good butter, one ounce of flour, all well mixed together; put in saucepan with the chickens; put on the fire to boil tender; season with pepper and salt. Serve with toast bread, in the bottom of the dish.

Chicken Roast.—Chickens should be managed in roasting the same as turkeys, only that they require less time. From an hour to an hour and a half is long enough.

To roast fowls the fire must be quick and clear. If smoky it will spoil both their taste and looks. Baste frequently, and keep a white paper pinned on the breast till it is near done.

Ducks and Geese Roast.—Take sage, wash and pick it, and an onion; chop them fine, with pepper and salt, and put them in the belly; let the goose be clean picked, and wiped dry with a cloth, inside and out; put it down to the fire, and roast it brown. Ducks are dressed in the same way. For wild ducks, teal, pigeons and other wild fowl use only pepper and salt, with gravy in the dish.

Pigeons Boiled.—Boil them about fifteen minutes by themselves; then boil a piece of bacon. Serve with slices of bacon and melted butter.

ENTRÉES AND MADE DISHES.

Mayonnaise Sauce.—The yolks of two eggs well beaten; one teaspoonful salt; one tablespoonful mustard; about half a pint sweet-oil poured in dry by drop, beating all the time. Thin the whole with lemon-juice or vinegar as prepared. A little cayenne pepper may be used. This dressing is suited for chicken, lobster or other salad.

Chicken Salad.—To one chicken cut up in small squares (light and dark meat may be used) take three quarters of the bulk in chopped celery; for the dressing, the yolk of one raw egg well beaten; add the oil a drop or two at a time, beating well. Any amount of oil may be used in this way so long as the mixture remains stiff. Then add salt, mustard, pepper and vinegar to taste. If lettuce is used, the pieces must be well dried and broken, not cut.

Lobster Salad.—Take inside of large lobster, mince fine, take yolk of two eggs boiled hard and mashed fine, with four tablespoonfuls of sweet-oil; pepper, salt, vinegar and mustard to taste; mix well; add celery or lettuce to taste; then, when serving, garnish with hard-boiled eggs.

Chicken Croquettes.—Take a chicken thoroughly boiled and chop fine; add half a cup cracker

crumbs; season with salt, pepper, chopped parsley; add two cups drawn butter or chicken-broth; make into croquettes; fry to a delicate brown, and serve on a napkin.

Sweetbreads (STEWED).—Wash, then parboil, cut into small pieces, stew in a little water until tender; add a teaspoonful of flour, a piece of butter, and then boil up once. Serve with toast.

Sweetbreads (BROILED).—Parboil; rub with butter, and broil; turn often, and dip in butter that they may not become dry.

Pressed Veal.—Boil three pounds of veal until very tender; remove from the kettle and chop fine. Season with salt and pepper; add three quarters of a pound of boiled ham chopped. Let the hot broth be poured over the whole and well mixed in a bowl or mould, and then set away until cold and in shape.

Deviled Ham.—Take a pint of chopped ham with a little fat; mix a dessert-spoonful of mustard with a little water, add it to the ham with a spoonful of butter, and put in a pan over the fire; stir till heated through; pour in a bowl or mould, and set away to cool.

Chicken Pie.—Take one pair of good young chickens, cut in small pieces, season with pepper and salt and small strips of salt pork, put in saucepan with water to cover it, boil for half an hour, add flour and butter to thicken the gravy; have ready a large dish lined with paste; put all in the dish, and cover with a good rich paste. Bake for half an hour.

Veal Pot-Pie.—Take two pounds of best veal, cut in small pieces, half pound of salt pork sliced thin, four quarts of cold water, pepper and salt all, put on the fire, after boiling for one hour have three pounds of light bread dough, pick small pieces, say one-ounce pieces, put in saucepan with the veal and pork, and let it boil for twenty minutes. Serve as soon as taken from the fire.

Strasburg Potted Meat.—Take one and a half pounds of the rump of beef, cut into dice, put it in an earthen jar, with quarter pound of butter; tie the jar close up with paper and set over a pot to boil; when nearly done, add cloves, mace, allspice, nutmeg, salt and cayenne pepper to taste; then boil till tender, and let it get cold; pound the meat with four anchovies mashed and boned; add a quarter pound of oiled butter, work it well together with the gravy, warm a little, and add cochineal to color; then press into small pots, and pour melted mutton suet over the top of each.

Irish Stew.—Take four pounds of good breast of fat mutton, cut in small pieces; two large white onions; ten large potatoes, well peeled and sliced; put all in saucepan together, with fine herbs, pepper and salt to suit—a little salt pork is a

good addition—half pound flour, quarter pound good fresh butter, well rubbed together, and let it boil for one hour and have it well cooked.

Hashed Meat.—Take two pounds of fat corned beef, well boiled and cold; one pound of well boiled potatoes, cold; one large white onion; put in chopping-tray, mince it fine, put all in saucepan together, add two ounces butter, pepper and salt to taste; add boiling water to make it soft; set it on a slow fire, stirring it often. When well stewed, serve hot. It makes a fine relish for breakfast.

Bologna Sausages.—Take thirty pounds of chopped meat, eight ounces fine salt, two and a half ounces of pepper, two teacups of sage, and one and a half cups of sweet marjoram, passed through a fine sieve, or, if preferred, thyme and summer savory can be substituted for the latter.

Sausages (BOLOGNA).—Take equal quantities of bacon fat and lean beef, veal, pork, and beef suet; chop them small, season with pepper, salt, etc., with sweet herbs and sage rubbed fine. Have well washed intestines, fill and prick them; boil gently for an hour, and lay on straw to dry.

Sausage-Meat.—Take two pounds of lean meat, one pound of fat pork, chop fine, and mix with two tablespoonfuls of black pepper, one of cloves, seven of powdered sage and five of salt.

VEGETABLES.

Vegetables as a rule are improved by lying in cold water a while before being put into boiling water. Green corn and peas require to be cooked from 15 to 30 minutes; asparagus, 20 to 40 minutes; spinach, 10 to 20 minutes; parsnips, 30 minutes to 1 hour; cabbage, 45 minutes; beets, 1 hour to 2 hours; lima-beans (large), 40 minutes; string-beans, 1 hour to 2 hours.

Succotash.—Take one dozen ears of corn, cut the grains from the cob, add one quart of lima beans, and mix with the corn; put it on to boil in three quarts of water with one pound of pork cut; add black pepper and salt to taste. When the water has boiled away to one half the original quantity, serve in a tureen as soup.

Baked Tomatoes.—Wash the tomatoes, take out the seed, make a dressing of crumbs of bread and onions chopped fine; add salt, butter and pepper. Bake and serve hot.

Stewed Tomatoes.—Scald the tomatoes with hot water, take off the skins, put them in an earthen vessel, strain off the water, and add butter, salt and pepper to taste.

Mashed Turnips.—Wash turnips, boil well, take them up in the colander, press out all the water, mash very fine; season with salt, butter and sugar. Serve hot with trimmings.

Macaroni Boiled.—Take two pounds, break in small pieces, put in warm water to steep one

hour, drain off, put in saucepan with two quarts fresh cream, with grated cheese; season with red pepper.

Rice Boiled.—To boil rice take one cupful and wash it three times, letting it stand a few moments in the third water; put it then into three quarts of boiling water with a little salt; after boiling twenty minutes pour into a colander; then serve.

Saratoga Potatoes.—Peel and put whole into cold water. After remaining an hour slice very thin and throw into cold water for half an hour, then drain and dry. Throw the slices into a kettle of boiling lard, a handful at a time. As soon as they begin to brown, skim them out and sprinkle a little salt over them.

Stewed Potatoes.—Set two ounces of butter in a pan over the fire; when melted put the sliced or chopped boiled potatoes into it, adding a little milk or cream and stirring for about ten minutes.

Lyonnaise Potatoes.—To a quart of cold sliced potatoes, placed in a pan, add two tablespoonfuls of butter and a little sliced onion, and fry brown; when done, salt and pepper and add a little butter.

Potato Croquettes.—Mash a quart of boiled potatoes, add salt, pepper and butter, mix in also two beaten eggs; make into rolls or balls, and fry in hot lard. A little milk may be used if too stiff.

Cauliflower with Cream Sauce.—Boil the cauliflower, which should be washed, trimmed and tied in a piece of coarse net or muslin. The water should be salted and the cauliflower placed stem end up. Prepare in a saucepan one cup of scalding milk, one tablespoonful of corn-starch wet with cold water, two tablespoonfuls of butter; pepper and salt to taste. Drain the cauliflower, remove the net and place in a deep dish, flower end up; pour over the boiling sauce.

Winter Squash.—Pare and take out the seeds, cut into pieces, place in cold water for about one hour; boil until soft; drain off the water thoroughly and mash, stirring in a spoonful of butter, then salt and pepper.

Summer Squash.—Quarter summer squashes, place in cold water ten minutes; boil until tender (about twenty minutes), remove the skins, mash, pressing all the water out; add butter, salt and pepper; serve hot. Some persons pare the squashes before boiling.

YEAST.

Recipes in this department may be proportionally reduced whenever a smaller quantity only is needed.

Compressed Yeast.—This yeast, so extensively used in Europe, is obtained by straining the common yeast in breweries and distilleries until

a moist mass is obtained, which is then placed in hair bags, and the rest of the water pressed out until the mass is nearly dry. It is then sewed up in strong linen bags for transportation. It will keep a long time, and is very highly esteemed by bakers. See Vienna Bread.

Hop Yeast.—Boil nine ounces of hops with three pails of water, put nine pounds of good flour in a tub, and strain enough of the hop-water over it to make it into a stiff paste; beat it up thoroughly; strain in the rest of the hop-water into the paste; let it stand until lukewarm; then add four and a half quarts stock yeast. It will rise one to three inches, but do not disturb it until it drops.

Stock or Malt Yeast.—Boil twelve ounces of good hops with four pails of water for about five minutes; then strain off enough of the liquid among eight pounds of good sifted flour in a tub to render it into a stiff paste, working it up thoroughly with a clean stick; then add the rest of the liquid to the paste; let it stand till lukewarm, and pulverize any remaining lumps with your fingers. Now add about eight pounds malt and six quarts stock yeast; allow it to work in a warm place till it rises and falls again, which will occupy from eight to twelve hours; strain through a hair sieve and stand in a cool place. In warm weather four gallons cold water might be added to the above previous to stocking it away.

Potato Yeast.—Pare and boil six potatoes and mash through a colander; mix with six tablespoonfuls of flour; pour on this a quart of boiling water (the water in which the potatoes were boiled is the best), add half a teacupful of sugar, a tablespoonful of salt; when cool mix in a teacupful of home-made yeast or half as much brewer's yeast.

BREAD.

To make good bread, three things are necessary—good flour, good yeast and careful baking.

Corn-Meal Bread, No. 1.—Take two quarts of corn meal, with about a pint of (thin) bread-sponge, and water enough to wet it; mix in about half a pint of wheat flour and a tablespoonful of salt; let it rise and then knead well the second time. Bake one and a half hours.

Corn-Meal Bread, No. 2.—Mix two quarts of new corn meal with three pints of warm water; add one tablespoonful of salt, two tablespoonfuls of sugar and one large tablespoonful of hop yeast; let it stand in a warm place five hours to rise; then add one and a half teacupfuls of wheat flour and a half pint of warm water. Let it rise again one and a half hours, then pour into a pan well greased with sweet lard, and let it rise a few minutes. Then bake in a moderately hot oven one and a half hours.

Vienna Bread.—The proportions of Vienna bread, confessedly inferior to none in the world, are: Flour, one hundred pounds; water and milk, nine gallons; salt, six pounds four ounces; pressed yeast, eighteen pounds twelve ounces. According to Prof. Horsford, good fresh middlings flour will compare favorably with the average Hungarian flour used in Vienna. The fresh pressed yeast is obtained by skimming the froth from beer-mash in active fermentation. This contains the upper yeast, which must be repeatedly washed with cold water until only the pure white yeast settles clear from the water. This soft, tenacious mass, after the water has been drawn off, is gathered into bags and subjected to hydraulic pressure, until there remains a semi-solid, somewhat brittle, dough-like substance, still containing considerable water. This is the pressed yeast, which will keep for eighty days in summer, and much longer on ice. For use it should be fresh and sweet.

The mixing is commenced by emptying the flour-sacks into a zinc-lined trough about two and a half feet wide and eight feet long, half round in form. Then with a pail holding about five gallons, equal parts of milk and water are poured, and left to stand until the mixture attains the temperature of the room, between 70° and 80° Fahr. It is then poured into one end of the trough and mixed by the bare hand with a small portion of the flour to form a thin emulsion. The pressed yeast is next crumbled finely in the hands, and added in the proportion of three and a half ounces to every three quarts of liquid, and then one ounce of salt in same proportion is intermingled through the mass. The trough is now covered and left undisturbed for three quarters of an hour, and after this the rest of the flour is incorporated with the mass in the above-named proportions.

The mass of dough, being allowed to rest for two and a half hours, becomes a smooth, tenacious, puffed mass of yellowish color, which yields to indentation without rupture and is elastic. It is now weighed into pound masses, and each lump is cut by machinery into twelve small pieces, each three quarters of an inch in thickness. Of each one of these the corners are brought together in the center and pinched to secure them. Then the lump is reversed and placed on a long dough-board for further fermentation, until the whole batch is ready for the oven. Before being introduced into the latter, the rolls are again reversed and restored to their original position, having considerably increased in volume, to be still further enlarged in the oven to at least twice the size of the original dough. In the oven they do not touch each other, and the baking occupies about fifteen minutes. To

glaze, the surface they are touched in the process of baking with a sponge dipped in milk, which, besides imparting to them a smooth surface, increases the brilliancy of the slightly reddish cinnamon color and adds to the grateful aroma of the crust.

Graham Bread.—Graham flour, three quarts; warm water, one quart; home-made yeast, one gill; molasses, one gill; salt, one tablespoonful; soda, one even teaspoonful. Let it rise slowly over night; if sufficiently light, pour into pans and bake about one hour and a half.

Raised Bread (Plain).—Three quarts flour; put two quarts in pan and mix with three pints hot water; make into a sponge with a quarter cake of compressed yeast. In the morning knead in one quart of flour and set to rise. When light, mix again and make into loaves and bake.

Boston Brown Bread.—Take one hundred pounds of Indian meal, fifty pounds rye meal, and ten pounds flour; sift and intermix together in the trough; strain in four gallons molasses, two gallons ferment or yeast; dissolve one pound soda and four pounds salt in water and add that. Now add water enough to mix all rather stiff, mixing well and breaking all lumps. Now mix in water enough to form a batter sufficiently thin to remain even on top; allow it to stand two or three hours after mixing before putting it into the pans and oven, then bake from six to ten hours in a slow oven.

Buckwheat-Meal Bread.—To two quarts of sifted buckwheat meal add hot water enough to wet the same; when sufficiently cooled, add one teaspoonful or more of salt, half a pint of yeast, and half a teaspoonful of molasses; then add wheat flour enough to make it into loaves (it should be kneaded well); and when risen light, bake or steam it three or more hours. If this should get sour while rising, add a teaspoonful of sugar and a little saleratus, dissolved in water. For bread from Indian meal proceed in the same way, using it instead of buckwheat meal.

BISCUIT.

Baking-Powder for Biscuit.—Bicarbonate of soda, four pounds; cream of tartar, eight pounds. These ingredients should be thoroughly dried and well mixed, and put up, proof against dampness. Use about three teaspoonfuls to each quart of flour, mix up with cold water or milk, and put it into the oven at once.

Cream-Tartar Biscuit.—Work in three pounds sifted flour with two ounces butter; add two ounces cream tartar; dish the middle and pour in one pint milk and one pint water, previously adding one ounce soda to the milk; mix all up briskly, but don't make it too stiff. Flatten it out; cut with a biscuit-cutter; place them on

buttered tins close together and bake in a quick oven.

Raised Biscuit.—One quart milk, four potatoes boiled and mashed through a colander, six ounces lard, four teaspoonfuls sugar, one of salt, a small cup of yeast; mix all together with flour to make a stiff batter over night; in the morning add more flour (but not a stiff dough), set in a cool place to rise, and about two hours before you wish to bake them, roll out, cut in small cakes and put into pans.

Parker-House Rolls.—Two quarts flour, one tablespoonful sugar, half a teaspoonful salt, piece of butter size of an egg, half a teacupful of yeast, one pint scalded milk. Put the flour, butter, sugar and salt in a bowl; make a hole in the flour; pour in the milk a little warm, add the yeast and mix in nearly all the flour; let it stand till morning; knead in the rest of the flour and let it rise slowly till two o'clock; roll out about an inch thick, cut into cakes; spread a little butter on each and fold over, put in pans to rise till light enough to bake for supper.

Graham Gems.—One quart Graham flour; stir to a stiff batter with cold water; add salt, put into hot buttered gem-pans and bake quickly.

Warren Tea-Cake.—Two cups flour, one egg, one teaspoonful soda, a small piece of butter, a little sugar, a little salt; beat the egg in a cup and fill it up with milk; pour into the flour after the other ingredients are stirred in. Small pans or a gem-pan should be used, and the cakes should be brought hot to the table and eaten with butter.

PUDDINGS.

A pudding to be boiled should be put in a tin pudding-boiler, close tightly, place in boiling water; where it must remain from four to five hours. Replenish with boiling water.

Green Gooseberries make a nice pudding by stirring a pint of them into a pint of batter, and either baking or boiling.

Hard Times Pudding.—Half pint of molasses or syrup, half pint water, two teaspoonfuls of soda, one teaspoonful of salt, flour enough to make a batter; boil in a bag three hours. Eat it with sauce.

Lemon Pudding.—Melt six ounces of butter, pour it over the same quantity of powdered loaf-sugar, stirring it well till cold, then grate the rind of a large lemon, and add it with eight eggs well beaten and the juice of two lemons; stir the whole till it is completely mixed together, and bake the pudding with a paste round the dish.

Orange Pudding.—Take one pound of butter, one pound of sugar, ten eggs, the juice of two oranges, boil the peel, then pound it fine and mix it with the juice. Add the juice of one

lemon, a wineglassful of brandy, wine or rose-water. If you do not have the fruit, add the extracts.

Potato Pudding.—Baked potatoes, skimmed and mashed, twelve ounces; suet, one ounce; cheese, grated fine, one ounce; milk, one gill. Mix the potatoes, suet, milk, cheese and all together; if not of a proper consistence, add a little water. Bake in an earthen pot.

Plum Pudding.—Pound six crackers, and soak them over night in milk enough to cover them, then add three pints of milk, four or five eggs, half a pound of raisins; spice with nutmeg and sweeten with sugar and molasses. Bake about two hours.

Ground Rice or Sago Pudding.—Boil a large spoonful of it, heaped, in one pint of milk with lemon-peel and cinnamon; when cold, add sugar and nutmeg and four eggs well beaten.

Tapioca Pudding.—Pick and mash a coffee-cup full of tapioca, and pour upon it one pint boiling milk; after standing half an hour, add another pint of cold milk, with sugar and raisins if you desire.

Winter Pudding.—Take the crust of baker's loaf of bread and fill it with plums, boil it in milk and water.

Troy Pudding.—One cup of milk, half cup molasses, half cup butter, one cup chopped raisins, three and a half cups flour; salt and spice to taste, and boil five hours. Serve with cold or hot sauce.

Cottage Pudding.—One cup sugar, one cup milk, two cups flour, three tablespoons of melted butter, two teaspoons cream tartar, one teaspoon soda, one egg; steam or bake; serve with cream or sauce.

Bird's-Nest Pudding.—Mix two large tablespoonfuls of flour with a pint of milk; add two well-beaten eggs and a little salt; pare and core six large apples; butter a pudding-dish, set the apples in, and pour over the batter. Bake three quarters of an hour and serve with sweet sauce.

Baked Apple Pudding.—Pare and quarter four large apples, boil them tender with a rind of a lemon in so little water that when done no water may remain, beat them quite fine in a mortar; add the crumb of a small roll, quarter pound butter melted, the yolks of five and whites of three eggs, juice of half a lemon, sugar to your taste, beat all well together, all in paste.

Corn-Starch Pudding.—Five tablespoonfuls of corn-starch to one quart of milk, dissolve the starch in a part of the milk, heat the remainder of the milk to nearly boiling, having salted it a little, then add the dissolved starch to the milk, boil three minutes, stirring it briskly; allow it to cool, and then thoroughly mix with it three eggs, well beaten, with three tablespoonfuls of sugar;

flavor to taste and bake it half an hour. This pudding ranks second to none.

Cocoanut Pudding.—To a large grated cocoanut add the whites of six eggs, half pound of sugar, six ounces of butter, half a wineglassful of rose-water, and bake in or out of paste.

SAUCES FOR PUDDINGS.

Clear Sauce.—Boil a pint of water and a large cup of sugar until clear and a little thickened; flavor with wine or fruit-juice.

Chocolate Sauce for Cottage or Plain Pudding.—One coffee-cup of boiled milk, two tablespoonfuls of chocolate mixed with the yolk of an egg, cold milk, a little sugar; stir into the boiling milk.

Kennebago Sauce.—Two cups powdered sugar, two tablespoonfuls butter, one cup boiling water, one glass sherry wine, nutmeg or cinnamon to taste. Rub the butter into the sugar, add hot water, then spice and wine. Cover tightly to keep in the strength of the wine, and set for twenty minutes in a saucepan of boiling water. Stir and send hot to the table.

Hard Sauce.—To two cups powdered sugar take half cup butter slightly warmed, so that it can be easily worked up with the sugar. When well mixed beat in half a teaspoonful nutmeg, add a little sherry wine or lemon-juice, put on a plate and set away to cool.

PIES.

Paste for Pies.—Rub together four pounds flour and four pounds of lard, with salt sufficient; add just water enough to mix the dough. It may be better to put flour on the bench, make a set of it, adding the salt, lard, water, and stirring together.

Paste to Cover Pies.—Mix together one and a half pounds of lard or butter with two pounds flour, with sufficient salt and water to mix. Cranberry pies should have strips of puff-paste across the top, the edges wet, and a strip of puff-paste placed around the rim, keeping this strip a quarter of an inch outside of the edge of the plate, as it will contract while baking.

Puff-Paste Short for Pies.—Mix together four pounds flour, one and a half pounds butter, add four eggs, a little salt and one pint water or a little more; work all to a smooth paste, spread out with the hand, put one and a half pounds more butter in the middle, fold the dough over the butter, so as to cover it, let it stand five minutes, sift flour over the paste and on the slab, roll out to the length of seven feet and three feet wide (for half this quantity, one half of these dimensions will be required). Fold it over and turn so that the sides will face you, repeating the rolling twice, when the paste will be fit for use. For all kinds of fruit pies, have your fruit

sweetened to your taste, and then put in a short crust. Bake in a hot oven.

Peach Pie.—Pare but do not stone ripe peaches; put them into pans well lined with paste, sweeten well, cover with pastry and bake. Eat fresh, not hot. Powdered sugar can be shaken over them.

Squash Pie.—To one pint of squash when boiled, mashed and strained, add two cups milk, one cup of sugar, four eggs well beaten, half a teaspoonful of ginger and a little mixed mace and cinnamon.

Pumpkin Pie.—Stew the pumpkin dry, and make it like squash pie, only season rather higher. In the country, where this *real Yankee pie* is prepared in perfection, ginger is almost always used, with other spices. There, too, part cream, instead of milk, is mixed with the pumpkin, which gives a richer flavor.

Washington Pie.—One cup of sugar, third of a cup of butter, half a cup of sweet milk, one and a third cups of flour, one egg, half a teaspoonful of soda, one of cream of tartar, lemon flavor. Grease two round tins, and put in the above. Bake until done. Then put it on a dinner-plate, spread with nice apple-sauce, or sauce of any kind; then another layer of cake on top. It is nice without sauce, but sauce improves it.

Crumb Pie.—Mince any cold meat very finely, season it to taste, and put it into a pie-dish; have some finely grated bread-crumbs, with a little salt, pepper and nutmeg, and pour into the dish any nice gravy that may be at hand; then cover it over with a thick layer of the bread-crumbs, and put small pieces of butter over the top. Place it in the oven till quite hot.

Custard for Pies.—Put twelve eggs, half pound sugar, half ounce salt, and a little extract of lemon into a bowl, beat well together, add two quarts milk and strain.

Lemon Pies.—Rub together one pound butter and one and a half pounds flour, with cold water sufficient to make a good stiff dough, to bottom your plates with, rimming them around with puff-paste, and fill with the following mixture; put into a bowl the juice of three lemons, the grated rind of one with one and a half pounds of finely powdered sugar and nine eggs. Mix thoroughly, and fill your plates with the mixture; bake in a moderate oven.

Another filling.—Three lemons, six eggs, three quarter pounds sugar, half pint milk, with salt and nutmeg. Mix as the last.

Another without Lemons.—One pound sugar, half pound flour, ten eggs, half pint milk, quarter ounce tartaric acid, a little lemon essence and salt.

Frosting for Lemon Pies.—Four ounces pulverized sugar, whites of six eggs beaten to a stiff froth and the sugar gradually added to it; inter-

mix thoroughly, cover the pies, top them off with this frosting, run them into a moderate oven and bake them to a nice brown.

Lemon Pie with Three Crusts.—A layer of crust, a layer of lemon sliced fine, a little sugar, layer of crust again, and sugar and lemon again, then the upper crust.

Another Way.—One cup sugar, one cup sweet milk, one egg, one and a half lemons, the grated peel and juice, one tablespoonful flour; then, after baking, the white of an egg beaten, sweetened and put on the top, then set in the oven and browned.

Mince Pies.—Meat one pound, suet three and a quarter pounds, currants, raisins and plums two pounds, one glass brandy or wine, allspice, cinnamon and cloves to your taste, sugar sufficient to sweeten. Bake in a short crust.

Mince Pies, Filling for.—Boil three pounds of chopped meat, clear of bones and tough pieces, chop fine; peel, core and chop nine pounds of good apples, add four and a half pounds brown sugar, three and a half quarts molasses, three ounces each of nutmeg, cassia, cloves and allspice, three pounds raisins, one and a half pounds currants, one and a half pints brandy, one gill cider, three quarter pound salt. Mix all the ingredients together in a vessel, omitting the apples and brandy; intermix well together; then add them and reduce to the proper consistency with water. Cover with a cloth, tying it down tightly to prevent evaporation, and set away in a cool place for use.

Orange Tartlets.—Two oranges, juice of both and the grated peel of one, three quarter cups of sugar, two tablespoonfuls of butter, juice of half a lemon, one teaspoonful of corn-starch wet with lemon and a little water. Beat to a rich cream and bake in small paste-shells.

Apple Pie.—Stew apples, green or ripe, after having pared and cored them; mash, sweeten, and while hot stir in a teaspoonful of butter for each pie, and season with nutmeg. When cool, fill your crust, and crossbar with strips of paste, or leave entirely uncovered, and bake. Eat hot or cold; with powdered sugar if you like.

Sliced-Apple Pie.—Pare, core and slice tart ripe winter apples, line your dish with a good crust, lay in a stratum of fruit, sprinkle light-brown sugar thickly over it, put in a half-dozen cloves, and then another stratum of fruit, and so on till you have the thickness you want. Cover with crust and bake. Serve with powdered sugar sifted over the top.

Cocoanut Pie.—Take one pound grated cocoanut, half a pound powdered sugar, one quart unskimmed milk, six eggs beaten to froth, a little nutmeg and a little vanilla or rose-water. Boil the milk, remove from the fire, and gradually

whip in the eggs. When nearly cold, season; add the cocoanut, and pour into paste-shells. Bake twenty minutes.

If you pour the raw mixture into cups and bake by setting in a pan of boiling water, stirring once well as they begin to warm, you will have *Cocoanut Cup Custard*.

Rhubarb Pie.—Peel the stalks, cut in half-inch lengths, strew plentifully with sugar, and fill the crusts with the raw fruit. Cover and bake about forty minutes, take out and brush with egg white hot, and return to the oven to glaze.

CAKES.

General Directions.—Always use the best materials. Cream the butter and sugar together. Use a Dover egg-beater and beat whites and yolks separately. Cream tartar should be sifted through the flour; soda dissolved in hot water or milk. The success of cake depends on having the ingredients beaten together before the flour is put in, after which stir as little as possible. Shake a little sugar over the loaf before putting into the oven; this will insure a good top crust. Bake well. Dried currants should be carefully picked over and washed till clean, drained and spread to dry. Raisins should be stoned, cut or chopped. Fruit should be dredged with flour before putting in the cake, to prevent its settling.

Sponge Cake.—Six eggs, yolks and whites beaten separately; two cups sugar, two cups flour, a little salt, the juice and grated rind of a lemon. Before the flour is put in, the cake should be beaten a long time. After the flour is added, it should be lightly stirred. This quantity will make one large sheet or two small ones.

Cup Cake.—Break up two pounds butter, add three pounds sugar and sixteen eggs, a third at a time; beat up light, add five pounds flour, two pints milk, and ammonia two ounces; make all smooth by thorough mixing. Bake in small pans, in a moderate oven.

Drop Cake.—Rub together three pounds sugar and one and a quarter pounds butter; add thirteen eggs, in three different lots, three pints of sour milk, one and a half ounces soda, one and a half ounces ammonia; flavor with extract lemon; stir all well together, add flour sufficient to make a stiff batter; drop on buttered pans, bake in a quick oven.

Delicate Cake.—One half tumbler butter, one tumbler sugar, whites of three eggs, two tumblers flour (scant), one half tumbler milk, one teaspoonful cream of tartar, one half teaspoonful soda.

Adrea's Cup Cake.—One half cup butter, one cup sugar, one half cup milk, two cups flour, two eggs, one teaspoonful cream of tartar, one

half teaspoonful soda. Dried currants may be used.

Mountain Pound Cake.—One pound sugar, one pound flour, one half pound butter, three quarter cups of milk, one teaspoonful soda, two teaspoonfuls cream of tartar, six eggs, whites and yolks beaten separately. The butter and sugar should be beaten to a cream and part of the eggs added, then the flour and milk, then the remainder of the eggs.

Marble Cake.—Light part: whites of three eggs, one half cup butter, one half cup sugar, one half cup milk, two cups flour, one half teaspoonful soda, one teaspoonful cream of tartar. Dark part: yolks of three eggs, one cup molasses, one half cup butter, two cups flour, one teaspoonful soda, one third cup milk; flavor with spices. Butter the pan and put in the dark and light in alternate layers, leaving the light on top.

Cream Cakes.—Take one quart water and one pound dark coarse-grained lard; boil together in a kettle, and then stir in seventeen ounces of best-quality flour; boil all four or five minutes, or until it is quite smooth; then turn it out on a board, and scrape the kettle with a knife; now put your paste in the kettle again, with ten eggs; stir well together until all is smooth; then add eighteen or twenty more eggs, or until the batter is of the right thickness; next dissolve one quarter ounce soda in a little water, and mix in thoroughly; drop on pans slightly greased; wash them on top with egg, and bake in a quick oven. They will require sixteen to eighteen minutes to bake with a proper heat. When baked, remove from the fire; split them through the center and fill them with the following cream: Place on the fire one quart milk in a kettle, mix four ounces flour, eight ounces white sugar, four eggs and a little salt in another vessel; when the milk boils, turn in the mixture, stirring briskly; when it boils, remove from the fire, and flavor with lemon or vanilla as desired.

Orange Cake.—One cup granulated sugar, one half cup butter, one half cup cold water, two cups sifted flour, three eggs, reserving the whites of two; two teaspoonfuls baking powder, juice and grated rind of one orange. Bake on jelly-cake tins. This will make three layers. Filling: the whites of the two eggs, grated rind and juice of half an orange or lemon, two cups powdered sugar; place this between the layers and a smooth thick coating for the top.

Jelly Cake.—Juice and rind of one lemon, two eggs, one cup of sugar; cook the mixture in boiling water till it thickens.

Apple-Jelly Cake.—Four apples peeled and grated; juice and grated rind of one lemon, beaten yolks of two eggs; boil up and sweeten to taste. Make any good cup-cake and bake in jel-

ly-cake tins and put this filling between. The whites may be used for frosting.

Silver Cake.—One cup sugar, a half cup butter, a half cup milk, a half cup flour, whites of four eggs, one teaspoonful cream of tartar, a half teaspoonful soda. Almond or rose is good for flavoring. The same recipe for gold cake, using instead the yolks and flavoring with vanilla.

Chocolate Cake.—A half cup butter, one and a half cups sugar, two cups flour, a half cup milk, three eggs, one teaspoonful cream of tartar, a half teaspoonful soda. Filling: a half cake chocolate, add milk or water and piece of butter as large as a nut; sweeten and flavor to taste; cook it, stirring well, and spread between the layers and on top before it cools and stiffens.

Wedding Cake.—One and a quarter pounds butter, one and a quarter pounds sugar, one pound flour, three pounds raisins, three pounds currants, two pounds citron, ten eggs, two wine-glassfuls brandy; spice to taste.

Pigeon-Cove Berry Cake.—One cup sugar, butter size two eggs, one egg, four cups flour, one cup milk, one and a half pints whortleberries or blueberries. Better eaten hot, but may also be used cold.

Bath Cakes.—Mix well together one pound flour, a half pound butter, five eggs and a cupful of yeast; set the whole before the fire to rise; after it rises, add a quarter pound white sugar and one ounce caraway seeds well mixed in, and roll the paste into little cakes, bake them on tins.

Brandy Snaps.—Mix up one and a half pounds flour, a half pound butter, a half pound sugar, a half ounce cloves, and a half pint molasses. Mix all together and bake.

Cinnamon Cakes.—Put twelve eggs and six dessert-spoonfuls of rose-water into a bowl; whisk together, and add two pounds fine sugar and one ounce of ground cinnamon and flour sufficient to make a nice stiff paste; roll them out; cut into any desired shape, and bake them on paper, in a slow oven.

Citron Cake is made similar to the above, with the addition of sliced citron when the flour is added, or preferably put the citron on the batter after it is in the pans. Bake as the last.

Cocoanut Cakes.—To each pound of grated cocoanut add one pound of powdered sugar, and the whites of four eggs; put all in a kettle and cook on the fire for about thirty minutes, stirring well all the time, and avoid burning; cook to a soft and mushy consistence; turn it out and add to each pound of cocoanut as previously weighed two ounces of flour, working it well into the mixture. Now put it in well-greased pans, selecting a small piece in your hands, rolling it round and laying it on the pans, putting them about one inch apart, to allow for spreading, and bake in a cool oven.

Ginger Snaps.—Put two quarts molasses, one and a half pounds lard, three ounces ground ginger, two ounces soda, and one pint water into a bowl, mix all together; add flour enough to make a stiff dough, then work in two pounds sugar; roll thin, cut in long strips in rolls on the table; cut them off with a knife or cutter the desired size, put on buttered tins, flatten them down a little with the hand, and bake in a slow oven.

Ginger Snaps.—Take seven pounds flour, one quart molasses, one pound brown sugar, one pound butter, two ounces ground ginger, and then take one gill water, three quarter ounces saleratus; mix them all into dough and cut them out something larger than marbles, and bake them in a moderate oven.

Seed Cakes.—Rub together one pound butter and two pounds flour; then into a hollow in the center put four pounds sugar, two quarts milk, four ounces caraway seeds and a little ammonia; mix up, but do not work it much; roll out; cut with a small cutter, and bake in a warm oven.

Cross Buns.—Work twenty-four pounds dough, two pounds sugar, two pounds butter, twelve eggs and a little cinnamon into the dough, and set away to rise; then pinch them off in about two-ounce pieces; mold them up; pin out; put on pans, and mark them across with a knife or cross them with strips of dough.

Jumbles.—Rub together three pounds sugar and two pounds four ounces butter; add twelve eggs, a few at a time; beat all up well; add three quarter ounces ammonia, one and a half pints milk, a little extract lemon, and five pounds four ounces flour, and stir sufficiently to mix.

Crullers.—One cup sugar, one cup milk, butter size of an egg, two eggs, one teaspoonful cream of tartar, a half teaspoonful soda, flour enough to roll out, and cut into shapes just the right thickness for frying well. The crullers should be dropped into boiling fat, either lard or nice beef-drippings well clarified.

No. 1 Crackers.—Butter, one cup; salt, one teaspoon; flour, two quarts. Rub thoroughly together with the hand, and wet up with water; heat well, and beat in flour to make quite brittle and hard; then pinch off pieces and roll out each cracker by itself.

Boston, or Soft Crackers.—First sift in four barrels of flour into the trough, add two pails of stock yeast and about nine pails of water; mix all into a sponge and allow it to stand until it rises and falls twice. The sponge will require about six or eight hours to become ready; if it sours a little, so much the better. Usually it is set about noon for the work next day, and if set warm, for using stock yeast instead of ferment,

it will come less rapidly. The sponge being ready, add to it from eight to ten pails more water; mix and break the sponge up well, making a stiff dough, and let it stand until next morning. It is requisite that the dough should be sour, to insure good crackers. When ready, remove a sample of it sufficient for one ovenful of crackers; take it to another part of the trough, and add to it from five to six pounds of butter or lard, the proportion to be added to be estimated by the dimensions of the piece so separated; soda in solution is now to be added, made by dissolving soda, one pound, in cold water, one quart, and the detached piece of dough may be intermixed with one pint of the liquid, representing eight ounces of soda; but the exact quantity required must be ascertained by the acidity or age of the dough and the judgment of an experienced practitioner. Mix the soda and butter thoroughly into the dough, and put it through the rollers repeatedly or until smooth. Place a sample of this dough in the oven to determine whether or not it contains the proper quantity of soda. When baked, too much soda will induce a yellow appearance, and more dough without soda must be added; a deficiency of soda will be indicated by a sour smell, and in that case more soda must be added. When all is right, the dough is put through the machine, and the succeeding batch of crackers is commenced by selecting another piece of dough and proceeding as above, adding the butter and soda in the required proportion, each batch requiring more soda on account of the increasing acidity acquired by long exposure to the air.

Another way.—Set the sponge on the previous night, and the next day, instead of making dough of it, select a portion of the sponge, adding to it the butter and soda as above directed, working them well into it, and adding flour enough to make a stiff dough, and it is ready for the break. When you detach part of the sponge to make the batch, add water enough to the sponge, and stir it up with more flour, thus continuing to renew the sponge as fast as it is used.

Cream Crackers.—Rub together fourteen pounds flour and one pound butter; then add one pound pounded sugar, forty-eight eggs, and flavor; mix thoroughly, and work it quite stiff and smooth; roll out quite thin; cut them with a cutter in the form of an oak leaf; put them into boiling water and boil till they float; remove with a skimmer and dry them on cloths, and bake on clean pans without being buttered, in a warm oven.

Oyster Crackers are made of the same dough, using the scraps also. *Butter, Sugar* and other crackers are made the same way, adding respectively butter and sugar.

Soda Crackers are made by the same process, of

the same dough; after using the scraps, add a little more butter, rolling them thinner and cutting them square.

Sugar Crackers.—Flour, four pounds; loaf-sugar and butter, of each half a pound; water, one and a half pints. Make as above.

DESSERT.

Blanc Mange, Almond.—Take four ounces of almonds, six ounces sugar, boil together with a quart of water, melt in this two ounces of pure isinglass, strain in a small tin mold to stiffen it. When wanted, dip the mold in hot water and turn it out.

Blanc Mange, Lemon.—Pour a pint of hot water upon half an ounce of isinglass; when it is dissolved add the juice of three lemons, the peel of two lemons grated, six yolks of eggs beaten; add about a good wine-glass of Madeira wine to it; sweeten to your taste; let it boil; then strain it and put it in your molds.

Charlotte Russe.—Take one pint milk; dissolve with heat three ounces isinglass and one pound sugar; add, after it is cool, one quart beaten cream and flour; suit your taste, and line out some mold with sponge cake, and put the cream in it and cool.

Custard, Boiled, or Mock-Cream.—Take two table-spoonfuls of corn-starch, one quart of milk, two or three eggs, one half teaspoonful of salt and a small piece of butter; heat the milk till nearly boiling and add the starch, previously dissolved in one quart of milk, then add the eggs well beaten, with four table-spoonfuls of powdered sugar; let it boil up once or twice, stirring it briskly, and it is done. Flavor with lemon or vanilla or raspberry, or to suit your taste.

Crems, LEMON.—Take a pint of thick cream and put to it the yolks of two eggs well beaten, four ounces of fine sugar and the thin rind of a lemon; boil it up, then stir till almost cold; put the juice of a lemon in a dish or bowl and pour the cream upon it, stirring till quite cold.

FRUIT.—Take one half ounce of isinglass dissolved in a little water, then put one pint of good cream, sweetened to the taste; boil it. When nearly cold lay some apricot or raspberry jam on the bottom of a glass dish and pour it over. This is most excellent.

RASPBERRY.—Put six ounces of raspberry jam to one quart of cream, pulp it through a lawn sieve, add to it the juice of a lemon and a little sugar, and whisk it till thick. Serve it in a dish or glasses.

Ice Cream.—Beat the required quantity of ice very fine in a stout bag or by any other means, and add fine salt in ratio of one part of salt to four parts of ice, mixing thoroughly with a stick. Pack the compound neatly in the freezer around

the cylinder to the top, then put in the cream (which should be cool) you wish to freeze, and, after covering, proceed to turn the crank back and forth alternately ten or twelve times each way until the cream is sufficiently thick to beat, which will be known by the opposition to the beater, then turn forward quite briskly for a short space in order to impart an even and good appearance to the cream; make thorough work of the beating, then remove the beater, fill the pail with ice and salt, and set away to harden. It will not do to introduce additional ice or salt, or allow it to grow stiff while beating, or beat it too much, or to retard the freezing process by pouring off water from the melted ice. The right time to beat it is when it is dense enough to rise, or about the thickness of light batter; if beaten when rigid the product will not be so satisfactory. As the cream expands in freezing, the cylinder should be filled three fourths full and no more.

Strawberry and Raspberry Cream Ice.—Pass three pounds of picked strawberries or raspberries through a course hair-sieve, add one and a half quarts double cream, two and a half pounds sifted sugar, mix well together, freeze as above and mold it. If a deep red is desired, it may be imparted by a few drops of cochineal.

Ice Cream, Best Quality.—Beat well together nine eggs with one and a half pounds sugar; boil three quarts good cream, set it off for a short space, then add the sugar and eggs, flavor with vanilla, etc., to suit the taste. Let it cool, place in the freezer and proceed as above.

Substitute for Cream.—Boil one quart of good milk with one and a half ounces of arrowroot, having first brought the milk to the boiling point and mixed the arrowroot smooth with a little cold milk; remove from the fire, add two fresh eggs, eight ounces of powdered sugar, stir well, allow it to cool, and flavor previous to putting in the freezer.

Orange Cream Ice.—Mix together in a stew-pan one quart milk or cream, one pound sugar, the juice of eight oranges, the rinds of four oranges rubbed on the sugar, and four yolks of eggs, until the compound begins to thicken; stir briskly, and strain, freezing when cool, as above.

Pineapple Cream Ice.—Put on the fire in a copper or tin vessel one pound of strained pineapple pulp, twelve ounces sugar, one and a half pints milk or cream, and three yolks of eggs; beat sufficiently to thicken, not to boil the cream, strain the mixture into a vessel, and set aside to cool previous to freezing.

Lemon Jelly.—Two ounces of Cooper's or Cox's gelatine put to soak in a porcelain kettle with one pint of water; after it has soaked fifteen or twenty minutes put in about one pound of granulated sugar, the juice of four or five lemons—two

or three of the peels may be dropped in—and add three pints boiling water; the kettle may be placed on the back of the stove until thoroughly mixed, then remove, and strain through a jelly-cloth or fine sieve into molds or a large straight-edged dish; set away to cool, and when served take out of the molds in shape, or cut in cubes. Some like a little whiskey, as it gives a bright taste.

Wine Jelly.—Made the same as lemon jelly; but instead of lemons stick-cinnamon should be used, and about a pint of sherry or madeira wine in place of one pint of water. A little brandy is an improvement. Cochineal may be dissolved and added if a rich wine color is desired.

Vanilla Snow.—Four tablespoonfuls of gelatine soaked in a teacupful of cold water, one teacupful boiling water added; let all partly cool; one cup of sugar, then beat until white and foamy; a cake-beater is excellent, but an egg-beater will answer. Beat whites of four eggs to a stiff, then pour into the gelatine mixture and beat all together for perhaps fifteen minutes; add three teaspoonfuls vanilla flavoring. It should be poured into a salad-bowl or large round dish, and when cold hold its place heaped high in the dish. It is a very handsome dish and very delicate; good served with fruit or rich preserve.

DRINKS.

Tea.—Tea should be strong, hot and freshly made. If the tea is made in the kitchen the water should be freshly boiled in the tea-kettle. If a spirit-lamp is used on the table there is little danger of the water being stale. Scald the teapot, put in the tea and cover with boiling water. Let the pot stand five minutes for the tea to steep; it should be covered with a napkin or "cosey," then fill up the pot with boiling water.

Cocoa.—Six tablespoonfuls of cocoa to each pint of water, as much milk as water. Sugar to taste. Rub the cocoa smooth with a little cold water; have the quantity of water required boiling on the fire; stir in the grated cocoa paste; boil twenty minutes; add the milk, and boil five minutes, stirring often. There is a preparation of cocoa called cocoatina, which is powdered and needs no boiling.

Chocolate.—Six tablespoonfuls of chocolate to each pint of water, as much milk as chocolate. Make a smooth paste of the chocolate with cold water, and stir into the hot water; boil twenty minutes; stir in the milk and boil a few minutes more; sweeten to taste.

Coffee.—Put a quart of boiling water into the pot, wet a cupful of ground coffee with the white of an egg and a little of the shell and cold water; put all into the boiling water, and come up to a good boil; add a half cup cold water, let it settle a few minutes, and it is ready to serve.

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WINE.

This term is usually applied only to the fermented juice of the grape; when other fruits are used, the product is generally called *home-made* or *domestic* wine. The first element which determines the price of wines, as well as the duty levied on them, is the amount of alcohol they contain. Other qualities which they derive from the grape-juice are taste and flavor. When fermentation is not complete a certain quantity of sugar is left, and according to the quantity left wines are said to be "sweet" or "dry;" the term "dry" wine meaning that which has no sweetness.

The *flavor* and *bouquet* are sometimes compounded, but are really different. The vinous flavor is common to all wines, but the bouquet is peculiar to certain wines. The substance which gives the flavor is the ænanthic ether, and is formed during fermentation.

The bouquet is formed by some of the acids, after fermentation, uniting with the ethyl of the alcohol and forming ethers. The bouquet is that which makes one wine pleasanter to drink than another, and gives a great or small price when the qualities are otherwise the same.

Saline compounds give a character to wine. These are principally bitartrate of potash, tartrate of lime, tartrate of iron, chloride of sodium, chloride of potassium, with others. They do not affect the flavor, but their presence is a sure indication of the genuineness of certain wines.

Imported bottled wines are generally fit for consumption after two or three months' rest to recover from the agitation caused by traveling. In this state they are said to be "sick." Cask wine should rest the same length of time in a cellar, of even temperature. The proper time for bottling wine must, of course, be determined by a sample drawn from the cask.

AMERICAN WINES.

Until a recent period American wines were seldom seen upon American tables, and even now there is not as much known of them as their excellence demands, it being considered by competent judges that they are quite equal to many of the European wines. The wines of the Atlantic coast contain more acid, more sprightliness, flavor and bouquet, while the wines of the Pacific coast, or more commonly the California wines, contain more spirit, little acid and little flavor or bouquet.

White Wines.—The *Catawba* wine is the most used of white wines, but it varies according to the part of the country it is made in, that from northern New York, Ohio and Illinois being more acid and of higher flavor than that from farther south. The *Delaware* wine is next in popularity, and is of good color and fine body. The still wine is best. Other white wines are *Iona*, *Isabella*, *Massasoit*, *Herbmont*, and *Louisiana*.

Red Wines.—Of these the *Concord* wine is almost as much used as the *Catawba*. It has an invigorating effect, and should supplant the lower-priced imported clarets as it is better, cheaper and more wholesome. *Virginia Port* is dark red, very heavy, has a strong aromatic flavor and is considered the best medicinal wine in America. Some of the other red wines are the *Cynthiana*, *Catawissa*, *Wilder* and *Devereaux*.

California Wines.—Of these *Hock* is quite similar to Rhine wine, and is largely drunk on the Atlantic coast. *California Port* is strong and sweet, probably on account of some sugar and alcohol being added to it. The wines of the *Sonora Valley* are of fine quality and hardly inferior to the *Catawba* wine. *Madeira*, *Sherry* and *Claret* are made in small quantities, but are of inferior quality.

An important fact about California wine is that the makers have abundant supplies from their vineyards, and therefore have little temptation to adulterate them.

BOTTLING WINE.

Cool, clear weather is best for bottling wine. Great care should be taken to cleanse the bottles perfectly. Coarse gravel is good for this purpose. The corks used should be fine-grained and show few pores. A cock should be inserted in the cask an inch and a half above the rim. As soon as the wine is so low that it will not run from the cock, the cask must be tilted (with great care, to prevent the lees from rising), and the rest of the liquor drawn immediately. The bottles containing sediment should be set upright to settle, after which they may be decanted and corked.

To prevent mold from collecting on the corks, melt two pounds of rosin and a quarter of a pound of yellow bees'-wax, and as it begins to cool dip the bottles up to the rim around the neck.

FINING WINE.

To fine white wine, take (for one hogshead) an ounce and a half of isinglass dissolved in a pint and a half of water and thinned with the wine. Red wines are fined with the whites of eggs in the proportion of twelve or sixteen to the pipe. They should be beaten to a stiff froth, and a pint of wine and water added before pouring into the liquor.

KEEPING WINE.

The temperature of the place where wine is kept should be as near 50 degrees Fahrenheit as possible. The bottles should be laid on the side with the labels up, that they may be disturbed as little as possible. The length of time wines may be kept depends upon their strength. It may be roughly stated that clarets and light wines are good from three to ten years; Burgundies and heavier wines from five to thirty years; Madeira, port and sherry for an almost indefinite time.

SERVING WINE.

In serving wine do not ice it by putting ice into the wine, but always put the bottles into a vessel with the ice around them. When wines are to be served of the temperature of the room, they may be moderately warmed; but it is better to let them stand in the room before using; long enough to acquire the right warmth.

ALE AND BEER.

Beer, German *Bier*, is a fermented liquor made from malted grain. In Europe it is generally made from barley, and in this country also from wheat; hops being added to improve the flavor.

The more spirituous liquor made in England and this country is called ale. German brewers make a distinction between ale and beer on account of the different methods of fermentation; ale being produced by rapid fermentation, while beer is produced by a slow process in a cool cellar. In this country the term lager-bier is applied to many kinds of beer made by the slow process of fermentation, but not rightly, for it has not lain long enough to acquire that name, and is known among brewers as *schenkbier*, or beer ready to be drawn.

Edinburgh Ale.—Employ the best pale malt—1st, mash two barrels per quarter, at 183°, mash three quarters of an hour, let it stand one hour, and allow half an hour to run off the wort; 2d, mash one barrel per quarter, at 180°, mash three quarters of an hour, let it stand about three quarters, and tap as before; 3d, mash one barrel per quarter, at 170°, mash half an hour, let it stand half an hour, and tap as before. The first and second wort may be mixed together, boiling them about an hour or an hour and a quarter with a quantity of hops proportioned to the time the ale is required to be kept. The first two may be mixed together, at the heat of 60°, and the second should be fermented separately for small-beer. The best hops should be used in the proportion of about four pounds for every quarter of malt employed.

Porter—Brown Stout.—Pale malt, two quarters; amber and brown malt, of each one and a half quarters; mash at three times with twelve, seven and six barrels of water; boil with hops, fifty pounds; set with yeast, twenty-nine pounds. Product, seventeen barrels, or one and a half times the malt.

Half and Half.—In London this drink is made by mixing half porter and half ale; in America, it is made by mixing half new and half old ale.

Philadelphia Beer.—Take thirty gallons water; brown sugar, twenty pounds; ginger-root, bruised, one quarter pound; cream of tartar, one and a quarter pounds; carbonate of soda, three ounces; oil of lemon cut in a little alcohol, one teaspoonful; the whites of ten eggs, well beaten; hops, two ounces; yeast, one quart. The ginger-root and hops should be boiled for twenty or thirty minutes in enough of the water to make all milk-warm, then strained into the rest and the yeast added and allowed to work itself clear; then bottle.

Belfast Ginger Ale.—Double-refined sugar, powdered, one pound; bicarbonate of soda, three and a half ounces; citric acid, four and a half ounces; concentrated essence of ginger, one and a half ounces; essence of cayenne, two drachms; essence of lemon, forty drops. The soda, acid and sugar must be carefully dried separately at a

temperature not exceeding 120°; and the sugar before drying must be thoroughly incorporated with the essences, to which a small quantity of caramel, as color, may be added. The whole forms a powder, a dessertspoonful of which will make a tumblerful of the drink.

Small-Beer.—A handful of hops to a pail of water, a pint of bran, add half a pint of molasses, a cup of yeast, and a spoonful of ginger.

Spruce and Ginger Beer.—Cold water, ten gallons; boiling water, eleven gallons; mix in a barrel; add molasses, thirty pounds, or brown sugar, twenty-four pounds; oil of spruce or any oil of which you wish the flavor, one ounce; add one pint yeast, ferment, bottle in two or three days. If you wish white spruce beer, use lump sugar; for ginger flavor, use seventeen ounces ginger-root, bruised, and a few hops; boil for thirty minutes in three gallons of the water, strain and mix well, let it stand two hours and bottle, using yeast, of course, as before.

Root Beer.—Water, ten gallons, heat to 60° Fahrenheit, then add three gallons molasses; let it stand two hours, pour it into a bowl and add powdered or bruised sassafras and wintergreen bark, of each a half pound; yeast, one pint; bruised sarsaparilla root, half pound; add water enough to make twenty-five gallons in all. Ferment for twelve hours, then bottle.

Ottawa Beer and Ginger Ale.—Ottawa beer is made by using eight ounces of a fluid extract which contains the concentrated strength of four pounds of thirteen different roots and barks, added to one gallon syrup which is mixed with fourteen gallons water, into which carbonic-acid gas is forced at a pressure of eighty pounds to the square inch. *Ginger Ale* is made in the same way, except that four ounces of extract is sufficient. When the ginger is really used, an extract deprived of resinous impurities is made use of, which gives a clear amber-colored drink.

RECIPES FOR BEVERAGES.

Catawba Wine.—Extract the juice from the grapes in a cider-press or by squeezing them in a cheese-cloth; to one and a half quarts of juice add two and a half pounds of white sugar, and fill up the gallon with water. The bung should be left open till fermentation ceases.

Elderberry Wine.—Proceed the same as for Catawba wine, substituting brown sugar for white.

Currant Wine.—Select ripe currants, stem them, mash thoroughly, and strain. To one gallon of the juice add two of water, and to each gallon of this mixture add four pounds of sugar, a gill of brandy and a quarter ounce of powdered alum; put the whole into a clean cask to ferment. In three to four months draw off, add another gill of brandy, and bottle.

Blackberry Wine.—Wash the berries, and pour one quart of boiling water to each gallon. Let the mixture stand twenty-four hours, stirring occasionally; then strain and measure into a keg, adding two pounds sugar, and good rye whiskey one pint, or best alcohol half pint, to each gallon; Cork tight, and put away for use. Some like it best with a quart of brandy added to every six gallons; some prefer it without brandy. After fermentation, take four ounces of isinglass dissolved in one pint of the wine, and put to each barrel, which will fine and clear it; when it must be drawn into clean casks, or bottled, which is preferable.

Raisin Wine equal to Sherry.—Boil the proper quantity of water and let it stand till cold. To each gallon of this, add four pounds of chopped raisins, previously well washed and freed from stalks; let the whole stand for one month, stirring frequently; then remove the raisins, and bung up closely for one month more; then rack into another vessel, leaving all sediment behind, and repeat till it becomes fine; then to every ten gallons add six pounds of fine sugar and one dozen of good oranges, the rinds being pared very thin and infused in two quarts of brandy, which should be added to the liquor at its last racking. Let the whole stand three months in the cask; then bottle. It should remain bottled twelve months. To give it the flavor of Madeira when it is in the cask, put in a couple of green citrons, and let them remain till the wine is bottled.

Ginger Wine.—Water, ten gallons; lump sugar, twenty pounds; bruised ginger, eight ounces; three or four eggs. Boil well and skim, then pour hot on six or seven lemons cut in slices, macerate for two hours; then rack and ferment; next add spirit, two quarts, and afterwards finings, one pint; rummage well. To make the color, boil half ounce saleratus and half ounce alum in one pint water till you get a bright red color.

Unfermented Wine.—To make this, boil grapes of any kind over a slow fire till the pulp has thoroughly separated from the skin, adding just enough water to prevent burning at the bottom of the vessel, then press the juice through a fine cloth and add one quarter its weight of sugar, mix well, bring the juice to the boiling point once more, and can it in air-tight jars. This wine will keep sweet for years, and has the color of port.

American Champagne.—Good cider (crab-apple cider is the best), seven gallons; best fourth-proof brandy, one quart; genuine champagne wine five pints; milk, one gallon; bitartrate of potassa, two ounces. Mix, let stand a short time; bottle while fermenting. An excellent imitation.

Champagne Cider.—Good pale cider, one hog-head; spirits, three gallons; sugar, twenty pounds; mix, and let it stand one fortnight; then fine with skimmed milk, half a gallon; this will be very pale, and a similar article, when properly bottled and labeled, opens so brisk that even good judges have mistaken it for genuine champagne.

Sweet cider can be kept fresh and sparkling by heating it, not boiling it, but heating until almost boiling, and then bottling it, and sealing tight at once. It is advisable to put one or two raisins in each bottle.

Soda Syrups.—Loaf or crushed sugar, eight pounds; pure water, one gallon; gum arabic, two ounces; mix in a brass or copper kettle. Boil until the gum is dissolved, then skim and strain through white flannel, after which add tartaric acid, five and a half ounces; dissolve in hot water; to flavor, use extract of lemon, orange, vanilla, rose, sarsaparilla, strawberry, etc. etc., half ounce or to your taste. If you use juice of lemon, add two and a half pounds of sugar to a pint—you do not need any tartaric acid with it; now use two tablespoonfuls of syrup to three quarters of a tumbler of water and one third teaspoonful of super-carbonate of soda, made fine. Drink quick. For soda fountains, one ounce of super-carbonate of soda is used to one gallon of water. For charged fountains no acids are needed in the syrups.

Cream Soda.—Loaf sugar, ten pounds; water, three gallons; warm gradually so as not to burn; good rich cream, two quarts; extract vanilla, one and a half ounces; extract nutmeg, half ounce; tartaric acid, four ounces. Just bring to a boiling heat, for if you cook it any length of time it will crystallize. Use four or five spoonfuls of this syrup instead of three as in other syrups; put half teaspoonful of soda to a glass, if used without a fountain. For charged fountains no acid is used.

Ginger Pop.—Take one pound white lump sugar, one ounce cream tartar, one ounce ginger, bruised, and one lemon cut in slices; put all into an earthen pot, and pour over them one and a half gallons of boiling water; when lukewarm, toast a slice of bread, spread it thickly with yeast, and put into the liquor. Mix with it the white of one egg and the crushed shell. Let it stand till the next day, then strain and bottle. It will be ready for use in a few days.

Anisette Cordial, 40 Gallons.—Put in a barrel thirteen gallons 75 per cent alcohol; dissolve three and a half ounces essence of green anise-seed in one gallon 95 per cent alcohol, and add half gallon orange-flower water, eight or ten drops infusion of mace, and five drops essence of cinnamon; then put in the barrel twenty-six

gallons sugar syrup, 25 degrees Baumé; stir fifteen minutes, and let it rest four or five days; then filter. Add two or three sheets of filtering-paper.

For a small quantity, take quarter of an ounce of anise-seed; one and a half pounds of refined sugar; rectified spirits, two gallons; alum, quarter of an ounce. Mix thoroughly, then bottle.

Peppermint Cordial.—Good whiskey, ten gallons; water, ten gallons; white sugar, ten pounds; oil peppermint, one ounce, in one pint alcohol; one pound flour well worked in the fluid; half pound burned sugar to color. Mix, and let it stand one week before using. Other oil in place of peppermint, and you have any flavor desired.

Apple Toddy.—One tablespoonful of fine white sugar, one wine-glass of cider brandy, half of a baked apple. Fill the glass two thirds full of boiling water, and grate a little nutmeg on top.

Glasgow Punch.—Melt lump sugar in cold water, with the juice of a couple of lemons, passed through a fine wire strainer; then add old Jamaica rum, one part of rum to five of the liquid.

Milk Punch.—One tablespoonful of fine white sugar, two tablespoonfuls of water, one wine-glass of Cognac brandy, half wine-glass of Santa Cruz rum, one eighth tumblerful of shaved ice; fill with milk. Shake the ingredients well together, and grate a little nutmeg on top. To make it hot, use hot milk and no ice.

Mint Julep.—One tablespoonful white pulverized sugar, two and a half tablespoonfuls water; mix well with a spoon. Take three or four sprigs of fresh mint, press them well in the sugar and water, add one and a half wine-glasses of Cognac brandy, and fill the glass with shaved ice; then draw out the sprigs of mint and insert them in the ice with the stems downwards, so that the leaves will be above in the shape of a bouquet; arrange berries and small pieces of sliced orange on top in a tasty manner, dash with Jamaica rum, and sprinkle sugar on top. Sip with a glass tube or straw.

Lemonade.—Half a pound of granulated sugar, one gill of lemon-juice free from seeds, one quart of water; mix the three ingredients. Add ice before serving. Lemons should be well rolled before squeezing.

Concentrated Lemonade.—Take essence of lemon, quarter of an ounce; citric acid, two ounces; lump sugar, three and a half pounds; water, one quart. Put the sugar into the water when cold, boil it, then pour it hot on the acids. Bottle it when cool. When serving, put a teaspoonful of syrup into a tumbler of water.

Milk Lemonade.—Half a pound of sugar in a quart of boiling water; add one gill of lemon-juice, one gill of sherry and a pint of milk. Stir the whole well together. Strain till clear.

MARKETING.

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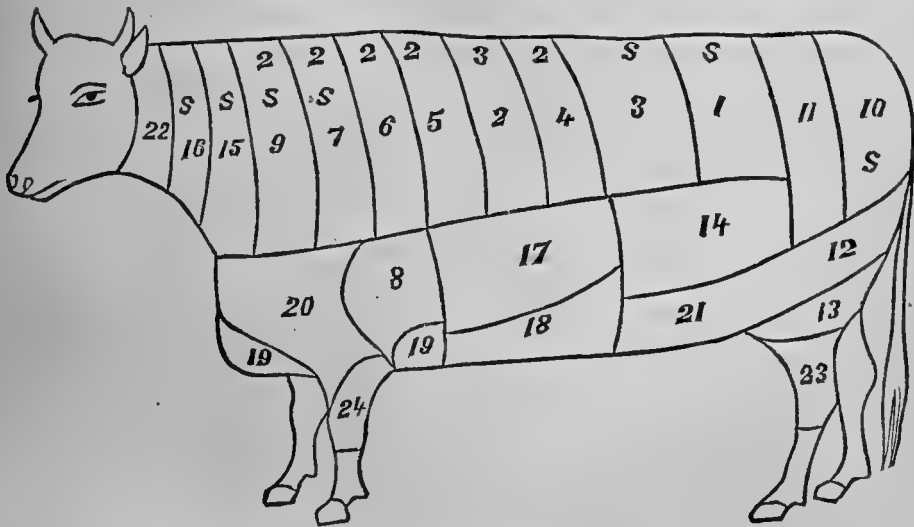
In the "good old times," as the fashion is to describe preceding generations, it was much more customary than now for the head of the family, husband or wife, to "go to market." The inevitable basket in which the purchases were to be conveyed home, was carried generally by the housekeeper, sometimes by an accompanying servant. "They tell" how a young dandy, making his morning purchase in Faneuil Hall market, hired a plain-looking old man for a trifle to carry home his marketing, and how the old man, after performing his task and receiving the promised pay, touched his hat and asked his employer

personally attend to their own marketing, as a morning visit to any large market will show: and their number might, with advantage to home-tables, be greatly enlarged. Beef and veal, mutton and lamb, and pork, are the standard meats expected in market.

BEEF.

In the New York markets a beef creature is usually cut up according to the following diagram:

The pieces marked S are commonly used for steaks: and the numbers on the top of the back



CHOICE HEIFER FOR BEEF.

Cut up and numbered as usual in New York City and vicinity.

- | | | |
|--------------------------------------|--|-----------------------------------|
| 1 S. Hip sirloin or thick sirloin. | 9 S. Third-cut chuck rib or chuck-piece. | 17. Plate-piece. |
| 2. Second-cut ribs or middle ribs. | 10 S. Rump of beef. | 18. Navel-piece. |
| 3 S. Small end sirloin. | 11. Socket or face rump. | 19. Brisket-piece. |
| 4. First-cut rib or first rib-piece. | 12. First-cut round. | 20. Shoulder clod. |
| 5. Third-cut ribs or thick ribs. | 13. Second-cut round. | 21. Flank-piece. |
| 6. First-cut chuck ribs. | 14. Top of sirloin. | 22. Third-cut neck or neck-piece. |
| 7 S. Second-cut chuck rib. | 15 S. First-cut neck or neck-piece. | 23. Leg of beef or leg. |
| 8 S. Cross rib. | 16 S. Second-cut neck or neck-piece. | 24. Shin of beef or shin. |

when thereafter he wanted such a service, to "remember Billy Gray"—a name then standing near the top of Boston's rich men. Now, in the cities and large towns, and in their vicinity, the butchers come or send for, and deliver orders; the housewife thus being served, if the butcher be capable and honest, more easily and cheaply than in the old way. Many a goodman, as he carves and distributes the savory joint, is unable to tell, except in the most general way, from what part of the "creature" it came; nor can the good-wife help him. Still there are many who

show the number of ribs in each roasting piece. In other parts of the country the butchers cut up the beef in slightly varying ways, and use differing names.

Good beef has a firm, fine grain, and a yellowish white fat. When first cut, it is of a quite dark red color, but after a short exposure to the air, turns to a clear cherry red. The beef should have a juicy or sappy appearance, with a fine smooth grain to the touch, and in cold weather, or after having been thoroughly cooled by ice, it should present a well-mixed or marbled appear-

ance. The fat should be of a clear straw-colored look, and that on the outside should entirely cover the back of the loin and ribs, in some places not less than half an inch. The suet should be of a brighter shade than the meat or muscle fat, should be hard and dry, break easily, and show little fiber. When oily or greasy, or tough and showing tough fiber, you may know that the animal has been overdriven, or improperly fed, and that the beef is not what you want.

A great deal may be written, and unnumbered directions given, as to the best cutting up of meat, and as to what parts are the most appetizing and nutritious, but any person can learn this so much more easily by seeing a creature cut up, and taking notice what parts turn out best in cooking, that we will not here attempt it. "Beef-steak" is said to have been discovered by a Roman of rank who had been set, as a punishment, to act as a menial sacrificer to Jupiter; and in performing the task to which he was forced, caught a piece that dropped from the coals. It burned his fingers, which he then thrust into his mouth. The slice thus carbonaded revealed to him a secret that all the world now enjoys.

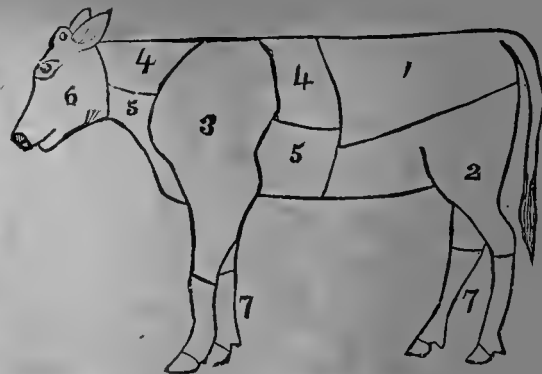
Here are the rules adopted one hundred and fifty years ago, by the celebrated English "Beef-steak Club." They are as good to-day as they were then:

"Pound well your meat, until the fibers break;
Be sure that next you have, to broil the steak,
Good coal in plenty; nor a moment leave,
But turn it over this way, and then that.
The lean should be quite rare—not so the fat.
The platter now and then the juice receive.
Put on your butter—place it on your meat—
Salt, pepper; turn it over, serve and eat."

De Vöe, in his "Market Assistant," gives the following as the origin of "porterhouse steak." A man named Morrison kept a porter-house frequented by sailors, one of whom, a pilot, came in hungry and called for a steak, just as Morrison had cooked the last he had cut. He had no beef except a sirloin roasting piece for his next day's family dinner, and from this he cut off a steak for the pilot, which so pleased him that he ordered another, and demanded that thereafter all his steaks should be like that. Others agreed with him, and Morrison's butcher had to learn to cut them that way "for the porter-house;" whence the name "porterhouse steak."

VEAL.

The calf, slaughtered and dressed, is called veal. In dressing, the skin is usually left on until the day it is offered for sale, being retained on the carcass for the purpose of keeping the flesh bright, moist and clean. It is generally cut up according to the following diagram:



1. Loin of veal.
2. Leg of veal.
3. Shoulder of veal.
4. Neck of veal.

5. Breast of veal.
6. Calf's head.
7. Calf's feet.

The best veal is that of a calf not under four or more than six weeks old, healthy and properly fed. When wholly fed from the cow, the flesh is what is called milk veal, white, tender, and delicate. After six weeks the calf requires more food than it can get from its mother alone; and this additional food increases the darkening which would naturally take place. When turned out and wholly fed on grass, the flesh becomes poor, dry, tasteless and dark.

Good veal should be fine-grained, tender and juicy, the fat firm and whitish. Not too white, which may show that the calf was bled before slaughtering, which, though it makes the veal whiter, takes away juiciness and flavor.

The loin, breast and shoulder are used for roasting pieces. Chops are cut from the loin and from the neck. The neck is used for pies, fricasees, stews, etc.; the leg for cutlets, fricandeaux, stews and roasts. A fillet of veal is a solid piece cut from the leg; and the lower part, the knuckle, is very satisfactory for soups and sauces.

The season for veal is April to September. It is not a nutritious or easily digested meat, but it is so available for different nice dishes, and its price so low in the season, that it always sells.

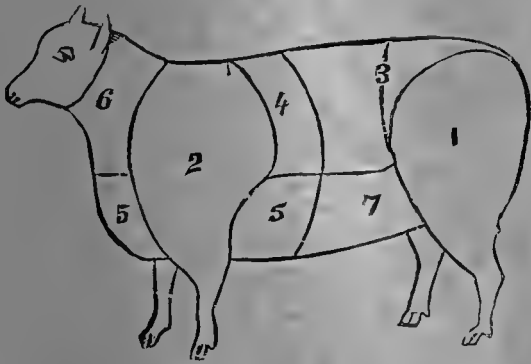
MUTTON.

A sheep, to make the best mutton, should be between three and five years old. The fat is then better mixed through the flesh when full fed, and if not driven too far the animal will have a large kidney fat. The cosset wether generally makes the best mutton. The fat should be white, clear and hard, the scored skin in the fore-quarters nearly red, the lean firm, succulent and juicy, darkish, red, and the leg bones clear, and almost or quite white.

The hind-quarter of mutton is made up of the leg and the loin, and taken from a prime animal will weigh twenty to thirty pounds. For a large family or a boarding-house, the whole hind-quarter makes a fine roast; but for a small family

either the leg alone, or the loin alone, is better. The leg has comparatively little bone, and although the price is greater, it is the most economical piece to buy. The two loins joined together are called a saddle.

Mutton is usually cut up as in the following diagram:



- | | |
|--------------------------|-----------------------------|
| 1. Leg of mutton. | 5. Breast of mutton. |
| 2. Shoulder of mutton. | 6. Scrag (end of the neck). |
| 3. Loin of mutton. | 7. Flank of mutton. |
| 4 and 6. Neck of mutton. | |

The fore-quarter includes the shoulder and breast, and with the shoulder-blade taken out makes a good roast for a large family. The shoulder alone is good for roasting or broiling, and the breast alone can be used for a roast, for broths, or for stewing. Rib chops are cut from the breast.

Chops and cutlets are cut from the loin. They are called long if the flank is cut on them, and short if it is not.

LAMB.

Lamb is cut and sold like mutton, but will not keep as long, for, being juicy, it taints more readily. When nearly a year old, it loses its tenderness and begins to taste like mutton. It is in season from May to September.

To choose lamb, examine the fat on the back and that of the kidneys, both of which should be white, hard and of the same color. Beware of two or three colors of fat found about the dressing of the hind-quarters, as very likely the difference comes from the mixing of two animals. Watch against a blown or spongy appearance, indicating human breath, which you certainly do not want to buy—at any rate, in that shape.

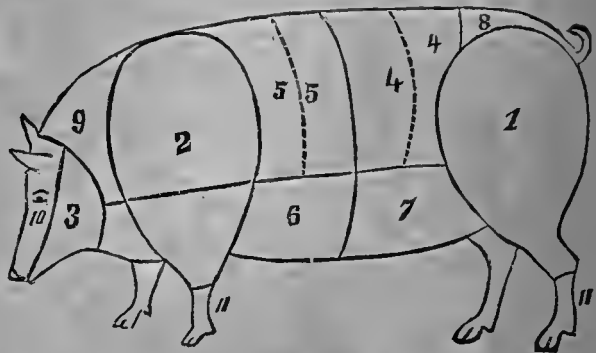
PORK.

In spite of the peremptory prohibition of pork among the ancient Hebrews, which has come down unchanged to their descendants, the present Jews—or Israelites, as they prefer to be called—and the occasional discouraging words which are flung at it by a doctor, Pork holds its

own. It makes an enormous part of the meat consumed to-day over a large part of the civilized world. That word covers the flesh of all ages and both sexes, natural, altered or spayed, after the creature ceases to be a "roasting pig."

For immediate use the best pork is from an animal whose carcass will weigh from fifty to a hundred and twenty pounds. The skin should be nearly white and semi-transparent in color; the fat on the back should be at least half an inch thick, firm and white, and the lean of a pale red-dish color. Larger hogs, those used for bacon, hams, etc., have a thicker and coarser skin than the younger and lighter, and their meat, though equally sweet, tender and juicy, is of a darker color. Such animals run from one hundred and fifty to five hundred pounds, though sometimes their weight reaches ten to twelve hundred pounds. The quality of their flesh depends much upon their feeding, Indian-corn, it is generally agreed, giving the most desirable pork.

The animal is thus cut up:



- | | |
|------------------------------------|----------------------|
| 1. Leg or fresh ham. | 6. Brisket. |
| 2. Shoulder (after being trimmed). | 7. Flank. |
| 3. Chops or cheeks. | 8. Tail-piece. |
| 4. Loin pieces. | 9. Neck-piece. |
| 5, 5. Rib, or chine pieces. | 10. Plate, or skull. |
| | 11. Feet. |

There are variations here and there from this method (especially with hogs cut up for export), but we need not consider them here.

The legs and shoulders are usually salted and smoked. The loin of a large animal has two or three inches of the fat cut with the rind. This is salted, and the loin roasted (fresh). In a small animal the loin is scored and roasted. The ribs are treated like the loin, and when the rind and fat are taken off, are called spare-ribs, and can be roasted. The ribs and loin are used for steaks and chops. The brisket is corned, as is also the flank. The head and feet are often sold fresh. Generally, however, the head is halved and quartered, and corned, and the feet are usually pickled. The inside fat and the scraps are cooked slowly until dissolved, then strained and cooled, and the product is called lard.

MANUFACTURE OF POTTERY.

[By the kindness of CHARLES K. OVINGTON, Esq., of the Firm of Ovington Brothers, Brooklyn and Chicago, we are enabled to furnish the following matter, taken from a very interesting pamphlet prepared by him for his Firm.]

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MANUFACTURE OF POTTERY.

Early History.—The rudest and simplest pottery is formed by hand from common clay, and dried and hardened by heat. This much knowledge must have been gained at an early stage in the world's history, for it is certain that pottery must have been somewhat perfected before any metals could be produced. The commonest example of this earliest and rudest pottery, is the ordinary building brick, which, with the ware known as terra-cotta, belongs to the division of unglazed pottery. The manufacture of this ware is very simple. The earliest method was doubtless to form the vessel by hand from a moist clay, and to dry it in the sun. The use of fire was the first improvement; the next was the potter's wheel. Both of these are of great antiquity, as is attested by representations of them upon old Egyptian tombs. The potter's wheel is a very simple contrivance for aiding the potter in producing perfectly round pieces, of a better finish than the rudely fashioned hand-made ware. The wheel is a flat disk or table revolving upon a central support, and kept in motion by the potter or his assistant. The potter throws a lump of clay upon the wheel, and while it is motion fashions it with his hands into whatever shape he may wish. His only tool is a wood or metal gauge, with which he forms or tests the outline of the piece.

Pieces of an irregular shape are made by hand in a much slower and more laborious way. Handles, knobs and raised ornaments are formed separately, and applied to the piece with a mixture of water and clay. After the piece has dried in the open air, it is put in a large oven or kiln, and fired at a high temperature. This is the process employed in almost every pottery. Terra-cotta made in this way may be painted in oil or varnish colors, or if mineral colors are used it may be baked again and the decoration made permanent.

Pottery was made in this way for a long time before any further improvements were inaugu-

rated. The need of something to overcome the porosity of the ware was long felt, and the Greeks made use of a coating of bees'-wax for this purpose. Some Egyptian potter conceived the idea of covering the ware with a coating of glass. To make this adhere it was necessary to mix sand with the clay. This art was probably introduced by the Egyptians to the Eastern nations. The addition of a considerable quantity of oxide of lead to the glaze, makes it more brilliant and much easier to melt; powdered borax is also used for the same purpose. Earthenware glazed in this manner was for a long time the only sort made in England, and is still very largely used.

Before the glaze is applied the ware may be painted in mineral colors; but as potters' clay is always of a red or buff color, the designs do not show distinctly. To obviate this the Italian potters covered the piece with a thin coating of fine white clay, which could then be painted and glazed as before described. Another very simple way of decorating this ware consists of cutting away the white coating so as to show the darker ground clay, this ware being known as sgraffito, or etched. It was found that a richer and purer body color could be obtained by mixing oxide of tin with the glaze, which changes by heat into a white enamel, upon which the most artistic designs can be painted and the richest and most delicate colors and lusters used. This is the nature of the Italian majolica, the manufacture of which still lingers in Italy in the towns where it gained its early triumphs, and is reflected in the French faïenceries of Gién and Limoges, and in Minton's English pottery. The wonderful luster colors used on this ware were kept a profound secret in two Italian workshops, to which ware was sent from all parts of the country to receive the enrichment of the iridescent lusters. This method of glazing was abandoned on account of the high price of tin, of which much is used.

The kind of pottery known as stone-ware has been made in England from very early times; it differs from ordinary earthenware in being much heavier, and capable of resisting the greatest

amount of heat. At first it was glazed with lead, but some one discovered that common salt answered this purpose much better, forming a perfectly pure, strong and beautiful glaze, capable of resisting the greatest amount of heat or chemical action. The Flemish gray and Doulton wares are examples of the artistic perfection to which this pottery may be brought.

The great aim of English potters has been to make and perfect a pure white earthenware. Wedgwood introduced the cream-colored ware called queen's-ware, which is still largely used. A fine white clay was brought from Cornwall to the potteries, and ironstone and calcined flints and bones were largely used to improve the color and quality of the ware. The English earthenware is now acknowledged to be the best made.

True Parian marble has a peculiar delicate play of light and shade upon the surface, caused by the mixture becoming partially vitrified, and allowing the light to penetrate a short distance below the surface.

Bisque, which is made in France and Germany, is porcelain baked and left without a glaze.

Earthenware may be decorated in mineral colors either before the pieces are glazed or after. The first method is the most durable. The pottery having been baked once, is presented to the artist in a porous state, and may be either painted or printed. In the first instance the artist paints the pattern in mineral colors, leaving each clear and distinct; the porous ware soaks up the color rapidly, rendering it impossible for errors to be corrected. This is the method of majolica and faience decoration. In printing, the pattern is transferred from paper to the porous ware. Then the piece is glazed and fired. In the other method of decorating, the ware is glazed and baked before the colors are applied. The painting can be done with more delicacy and finish, and the work can be re-touched if not satisfactory. The crazing or cracking of the glaze of pottery is generally caused by an unequal expansion of the glaze and body by heat. This crackle is sometimes intentionally produced, as in the celebrated Chinese rose crackle, the Japanese kioto ware, and the Longwy faience.

Pottery may be divided into glazed and unglazed.

Unglazed pottery is classed as hard or soft according as it is more or less easily scratched with a knife.

Glazed pottery is classed according to the nature of the glaze, as:

Lead-glazed; such as common earthenware:

Glass-glazed; as the antique pottery:

Enameled, or opaque glazed; as the Italian majolica:

Salt-glazed; or stone-ware.

PORCELAIN.

Porcelain is classified by the best authorities as Hard paste, Soft paste, and English. The hard paste cannot be scratched by steel, and is made of a clay formed by the decomposition of feldspathic rock; hence it is called a natural porcelain. The Oriental, German and French porcelains all belong to this class.

The other porcelains, though formed of nearly the same materials, are glazed with a compound of pounded glass, the English containing in addition both lead and calcined bones, which impart a peculiar softness and luster. These are called artificial porcelains. Old Sèvres and Vincennes, and the modern Pate-tendre, are the best examples of the soft-paste porcelain. Copeland and Minton are the leading manufacturers of English porcelain.

Porcelain may be modeled by hand or formed on the potter's wheel, in the same manner as earthenware, but there are two other processes of making it; viz., pressing and casting. In the first method a thin roll of the clay is laid in a mold and pressed into the desired form. In casting, the molds are formed of plaster of Paris, with an opening at the top. The clay is dissolved in water to the consistency of cream, and the mold is filled. The plaster absorbs the water, and a thin coating of clay adheres to the mold. This operation is repeated until the required thickness is obtained. The process of casting is specially adapted to pieces bearing a fine or intricate pattern in relief.

ANCIENT POTTERY.

Antique pottery is found in almost all parts of the world; that discovered by Dr. Schliemann in his excavations on the site of ancient Troy bears marks of great antiquity. Fragments of pottery have been found in Egypt at such a depth below the present ground-level as would indicate that they must have remained there at least 5000 years. There is every reason to believe that Egypt was the first country to produce porcelain as well as a perfected earthenware. From Egypt, the art may have traveled through Phenicia to Greece and Rome, and east through Assyria and India to China and Japan. The Chinese porcelain manufacture was well established about the commencement of the Christian era, and reached its greatest perfection about the twelfth century; while the Japanese were but a little behind them. The Eastern potters greatly improved the quality of the colors and glazes of the enameled pottery, while the Greeks perfected the forms of their vases and ornamented them with silhouette designs. After the fall of the Greek empire, Grecian artists continued the work in Rome and

Etruria; hence the name of Etruscan applied to these vases. The Romans themselves produced a red glazed pottery called Samian, which manufacture they carried to nearly all their provinces.

From this time until the fourteenth century there was very little artistic pottery made in Europe. The next great artistic inspiration came from Arabia and Persia. The Saracens, overrunning Africa and Spain, brought with them their various arts and sciences, and potteries were established at Majorca, Valencia, Malaga and Granada, whence richly glazed and decorated pottery was sent to Italy. These pieces were imitated by the Italian potters, at that time producing only common work, and carried to a high point of perfection by such artists as Luca della Robbia, Georgio Andreoli, and Orazio Fontana. With the extinction of the ducal houses that had been the munificent patrons of the art in Italy, the manufacture speedily declined; and the expulsion of the Moors from Sicily, Spain and Majorca, put an end to these potteries. Offshoots of the Italian potteries had been established in France and Holland, where a sort of majolica continued to be made at Delft, Moustiers, Nevers, and Rouen.

Oriental porcelain was introduced into Europe by the Portuguese and the Dutch, and imitated extensively at Delft and in England. Many attempts were made to make a true porcelain in Europe; the first that was successful was inaugurated at Florence by the Duke Francis de Medicis, and produced a few pieces of a curious blue porcelain. Porcelain was afterwards made in France at St. Cloud, Vincennes and Sevres, in England at Chelsea, Bow and Derby, and in Germany at Meissen, Vienna, Berlin and elsewhere. Many of these original potteries are still in operation.

Almost all the porcelain imported into the United States comes from France, either plain or more or less ornamented. We are also importing small amounts of French earthenware, both painted and printed, and majolica reproductions of Palissy ware. From England comes most of the earthenware, parian and majolica, and some finely decorated china and stone-ware. From Germany we import a little of the finest porcelain and of the common pottery, and a good deal of cheap china and bisque ornaments. Denmark has sent us a few pieces of the exquisite Copenhagen terra-cotta. Russia, Sweden, Spain and Italy produce characteristic porcelains, faïences and majolicas, only a very few pieces of which are exported.

In treating of the different potteries and of their distinguishing characteristics, each country will be taken in order, and the leading potteries

described, giving an account of their history, present condition and the nature of their productions.

MODERN POTTERY.

England.—One of the oldest, and certainly the most celebrated pottery in Staffordshire, is that founded by Josiah Wedgwood at Etruria and now conducted by his descendants. Wedgwood was unquestionably the greatest of English potters; indeed, it is not too much to say that no other potter ever did so much for the advancement of his art and of his country, or made so great improvements in the art of potting, as Wedgwood. During his lifetime, and in a great measure as the result of his labors, potting advanced from a neglected trade to one of the greatest industries of England, giving regular employment to thousands of operatives and producing pieces that have since been unrivaled. Wedgwood invented eight or nine different kinds of ware, the most noted being the cream-colored or queen's ware, the jasper, commonly called "Wedgwood" ware, and the black basalt, which he himself liked best of all. His cream-colored ware was unquestionably the best thing then made, and it has a warmth of color which is very pleasing. It is the jasper-ware, however, by which Wedgwood is best known, and in which he executed his reproductions of the Portland or Barberini vase. This vase was found in a Roman tomb, and passed from the collection of the Barberini to that of the Duchess of Portland. Then it was sold at auction for over a thousand pounds, Wedgwood obtaining from the purchaser, the Duke of Portland, the right of making copies of it. The vase is made of dark blue glass, upon which, in low relief, are engraved figures of an opaque white glass. Wedgwood formed the body of his vase of a hard clay, colored blue, and forming the figures in molds of a pure white clay, he applied them to the vase, which was then fired. A great deal of this ware is still made, some of it fully equal to the old, and also a superior quality of earthenware, often finely decorated.

After Wedgwood, the name most celebrated in the annals of English pottery, is that of Minton. Thomas Minton used to engrave on copper the patterns for printing earthenware. The most celebrated of these is that known as the "Willow" pattern, which he copied in 1780 from a Nankin plate, and which has enjoyed a great popularity to this day. He founded the pottery still conducted under his name, but does not seem to have done much toward improving the quality of the ware. His son, Herbert Minton, made great progress in the manufacture of pottery; introduced the manufacture of porcelain,

and originated the manufacture of encaustic tiles. It is with this last work that his name is most strongly linked, and "Minton tiles" are now world-famous.

Minton's potteries are situated at Stoke-on-Trent in Staffordshire, and comprise four separate and almost distinct establishments, devoted respectively to the manufacture of common earthenware, fine earthenware, porcelain and tiles. The cheaper earthenware made by Minton differs little from that made by other and less known makers; the colors are strong, the patterns always good, and the ware of fine quality. A good deal of handsomely printed ware is made in this department.

The method of manufacturing fine earthenware is the same as that of the commoner ware. In this department the most noted improvements have been in the coloring; a rich turquoise blue, and gorgeous shades of red, yellow, green and purple, having been introduced by Persian ware, which is copied from the Persian ware of the eleventh and twelfth centuries.

Majolica, in the commonly accepted meaning of the word, is a pottery generally coarse in texture, entirely covered with opaque colors or enamels, and with a very lustrous glaze. In speaking of Italian pottery, majolica applies only to those glazed with a metallic luster.

The Minton china is as fine as any made in England. The glaze melts at a much lower temperature than that of the French or German porcelain, allowing the use of richer and more tender colors. Minton's studio of china decorations contains some of the most skillful artists in England, and the quality of their work is very superior. A specialty of theirs is the *pâte-sur-pâte*, or *paste-over-paste* decoration, which is the work of M. Solon, a Frenchman, whom they tempted away from the Sèvres factory. In this ware the vase or article to be ornamented is formed of the porcelain clay and colored some decided hue. The china clay is dissolved in water until it is about as thick as cream, and then applied to the article, which absorbs the water and leaves a fine white coating of clay. When the vase is fired the clay is vitrified, and the design stands out clear and free, the relief being produced by a greater thickness of clay. Minton also makes the finest quality of Parian marble statuary, many pieces being finely modeled, and all of them carefully finished.

The next factory in importance is that of Copeland: this too is an old house, the firm having included Josiah Spode, a contemporary of Wedgwood, and second only to him in his labors for the improvement of English pottery. A rich straw-colored ware of his invention, superior in some particulars to Wedgwood's queen's-ware,

was recently revived by the firm under the name of Spode or Ivory ware. In porcelain they rival Minton and Worcester, while their Parian is unequalled either for the quality of the ware or the variety and beauty of their productions, which are modeled by the most celebrated English sculptors, such as Gibson, Raphael Monti, Flaxman, Malempre, Durham, Westmacott and others. Their printed earthenwares are good in design and very reasonable in price.

In the district of Staffordshire known as the "Potteries," there are 190 firms engaged in the manufacture of earthenware, and 40 in that of china. Many of the china works are in Longton, a town noted for the cheapness of its products.

Besides these large establishments and others like them, uniting such varied manufactures, there are many smaller ones making a specialty of some particular manufacture, as Parian, earthenware or majolica.

Outside of Staffordshire there is little pottery made in Great Britain, the most noted factory being that at Worcester, where, in 1761, John Wall, a chemist, commenced the manufacture of a porcelain somewhat like the Vincennes ware. This became quite popular, and the works were called by the king the Royal Factory. The manufacture of glazed Parian has recently been introduced, many of the pieces being richly colored, some of them in imitation of the Japanese lacquered ivories. The ware is exquisitely transparent, and very delicate in design; some of it can only be told from the early work by the absence of the early mark. The colors used are very rich, brilliant and various; the delicate turquoise blue, the Chinese blue, and some shades of red and pink are especially noticeable. The Worcester artists have always had a decided leaning toward Oriental design; a yellow pottery in imitation of the Awata, enameled in Japanese designs and covered with clouds of reddish gold, is a marvel of beauty. Their white earthenware covered with Japanese emblems printed in a dark blue, is one of their characteristic styles.

An older, but less known pottery, is that of Coalbrookdale, which dates back to 1756. This factory has a reputation for making excellent copies of the Chelsea, Bow and Derby wares; their soft-paste porcelain is highly esteemed by English connoisseurs.

The clays used in the manufacture of English pottery come from the south-western counties of Cornwall, Dorset and Devon. There is now only one pottery of note in these counties. This is at Torquay, and produces very fine terra-cotta of a deep red color, smooth in texture and graceful in shape. A rich blue enamel has been introduced that contrasts admirably with the red clay, and

the pieces are sometimes tastefully etched and engraved. Statuettes and figures, as well as vases and all sorts of fancy articles, are made here.

Lambeth, a suburb of London, has been the seat of potteries for several centuries. Nearly a century ago, John Doulton here established a pottery for the manufacture of stone-ware. Nothing of an artistic nature was produced until 1861, when vessels of stone-ware were etched with various patterns, and attracted considerable attention at the London Exhibition. Thus encouraged, the manufacture was continued and confidence gradually gained. The ware made differs only in quality from the stone-ware in common use. There is quite a variety of color; dark blue, blue-gray, stone-gray, brown and black. The pieces may be decorated in four different ways: 1st. By etched or engraved patterns cut in the clay, and rubbed in with color; 2d. By designs cut in bas-relief, or geometrical or other patterns impressed in the clay; 3d. By dotted or beaded patterns; 4th. By painting or enameling. This stone-ware is very hard and strong, and pitchers, vases and tankards made of it are much used for mantel and sideboard ornaments. Terra-cotta ware is also manufactured here, as well as what is called the Lambeth faience, a rude ware handsomely painted, and covered with a rich glaze.

France.—The French porcelain manufacture is centered in the city of Limoges; but the oldest and most important manufacture is that of Sèvres, and of this we will first treat, as being the artistic center of the French ceramic manufacture. In 1698 soft porcelain was made at St. Cloud, and in 1753 the manufacture was removed to Vincennes and taken under the royal protection. After a time the works were removed to Sèvres, where they now remain, having passed under the control of the various republics, kingdoms and empires to the present time.

Old Sèvres ware commands very high prices; and doubtless, when rendered scarce by age, the ware now made will be very valuable. At first, only soft-paste porcelain was made, and the colors were very rich, the celebrated Rose du Barry and Bleu du Roi being the most celebrated. Hard paste was first made in 1768, and the manufacture of the soft paste was discontinued from 1804 until 1854.

The Sèvres porcelain is very pure, white and translucent, some of the pieces equaling in thinness the celebrated Japanese egg-shell china. The decoration of the Sèvres ware has always been in the hands of the most competent and skillful artists, and the reputation of the factory is sustained to-day by some of the first flower-painters of France. Flower-painting, in detached flowers, sprays and garlands, was always the

forte of the Sèvres artists, though portrait and historical painting was not neglected, and at one time the works of Watteau were largely copied. Efforts are now being made to introduce new colors and processes, especially towards reproducing the rich coloring of the Chinese. A cloudy blue sometimes mottled with gold, and giving the effect of lapis lazuli, is a specialty with this factory. All modern pieces of the Sèvres ware bear the mark of the factory, the letter S and the last two figures of the date.

While Sèvres is the artistic, Limoges is the commercial center of ceramics in France. A fine bed of kaolin was discovered near here in 1746, and soon after that the manufacture was started here, and has since steadily increased. Much of the porcelain is sold without being decorated, but now the taste for ornamental ware is increasing, and handsomely painted and tastefully printed sets are in demand. The French porcelain differs principally from the English in its greater hardness and purity. Of the *pâte-tendre*, or soft-paste porcelain very little is made, as the manufacture is exceedingly difficult; but the wonderful softness and translucency of the coloring repay the extra trouble and expense.

Limoges faience is the name popularly applied to the variety of earthen ware which is ornamented with flowers modeled in relief and highly colored and glazed, although it is made in many parts of France, as well as in Brooklyn and Cincinnati, U. S. A.

In Alsace and Lorraine, along the valleys of the Saar and the Rhine, is a group of manufactories that produce a strong, cheap and practical earthenware, used very extensively in France, Germany and Italy. These potteries are situated at Nancy, Lunéville, Sarrequemines and Sarrelouis in France, Longwy in Germany, and Maestrich in Holland.

Holland.—At Maestrich a quaint sort of pottery is made, and at Delft the traditions of the town are kept up in the manufacture of tiles and earthenware, decorated in blue, in the old Delft fashion.

Germany.—The pottery of Longwy produces many quaint and unique pieces. The crackle-work is much used here, and the masses of rich enamel separated by fine black lines, when used in connection with the fine network of crackle, has a very elegant effect.

On the Rhine, near Coblenz, are manufactories whose specialty is the reproduction of the old Flanders gray or Rhenish stone-ware, that flourished here three hundred years ago. Many of these pieces are made in the molds that were then in use, and are exactly the same as the originals. This ware is very strong, and is moderate in price. The clay is generally gray in color, and the shad-

ing and ornamenting is done in a deep cobalt blue.

At Munich there are a number of skillful painters of porcelain, who execute principally copies of celebrated pictures upon flat plaques or tiles. Some of this work is exquisitely done.

One of the specialties of the Dresden artists is the painting of china with Oriental designs in a cobalt blue, and in that they are still unrivaled. Miniature figures or statuettes in porcelain, richly colored, and ornamented with raised flowers or lace-work, is another branch of art in which Dresden has conquered all opposition, and has what glory there is in it to herself. Really the best work of the Dresden artists are the fine paintings of flowers and fruit, which are almost always strong in color, and exquisite in design and finish. Often the painted flowers are combined with those modeled in relief, with good effect. Figures and landscapes are also adapted from the paintings of Watteau, and at one time were almost a specialty here.

Hungary.—The factory of Mauritz von Fischer, at Herend, produces finely decorated porcelain and pottery, mainly imitations of the more celebrated manufactories. Old Chinese and Japanese ware, old Sèvres porcelain, the raised flower-work of Dresden, the basket-work of Vienna and the Italian Capo di Monte, are frequently copied.

At Budá Pesth, the capital of Hungary, is established a pottery where a very ornamental faience is made which is richly ornamented in elaborate patterns of an original character. The colors are rich and dark, and gold is applied in rough masses.

Austria.—At Vienna there was for a long time an Imperial Porcelain Factory, but in 1864 this was abandoned. The manufacture was taken up by a private company and is still going on, on a small scale.

On the Elbe are several potteries that make terra-cotta or lava ware in vases or fancy articles.

Denmark.—Copenhagen produces some fine pottery, very light and graceful in form, the shapes and decorations being reproductions of antique Greek and Egyptian vases. The best of this pottery comes from the establishment of P. Ipsen's widow.

Sweden.—Sweden is rich in porcelain clay and in fuel; with these natural advantages large potteries have been established that almost entirely supply the home demand. The Rorstrand Works at Stockholm make a great variety of porcelain in table and ornamental pieces, as well as iron-stone china, parian, faience and majolica. The Gustafsberg Works also make a variety of porcelain, majolica and faience.

Russia.—The Russian Imperial Factory at St. Petersburg was founded in 1744, and produces a

small amount of very fine porcelain, equaling the Sèvres and Dresden in finish.

Italy.—In Italy, the home of the majolica manufacture, there are now scattered through the kingdom, manufactories that keep alive the old traditions, and execute reproductions of the mediæval majolica. The most noted of these establishments is that of the Marquis Ginori, at Doccia, near Florence, founded in 1735, and producing artistic porcelain, majolica and faience. Reproductions of the majolica of Urbino, Castel Durante and Gubbio, are made here, as well as of the celebrated porcelain of Capo di Monte. After having attained a high point of excellence, the factory of Capo di Monte, near Naples, was abandoned, and the molds in which the ware was made were sold, some of them to Dresden, others to Doccia. The pieces made in these molds, and skillfully colored, are equal if not superior to the antique. At Monaco is an artistic pottery that makes a very pretty faience, sometimes in the style of the old Dresden ware. Torquato Castellani, of Rome, has devoted himself to the reproduction of Italian majolica of the fifteenth and sixteenth centuries, and is very successful in his efforts. There are also potteries producing artistic faience and majolica, at Naples, Perugia, Pesaro, Faenza, Pisa and Florence.

Oriental.—In Persia and Syria pottery is still made which has the flavor of the old work. In India the ceramic art seems to be rapidly dying out. Porcelain is made at Lhasa and Lahore, but in small quantities; tiles and cheap earthenware are made quite generally.

China.—Regarding the porcelain manufacture of China it is impossible to obtain accurate information. The authorities still keep the processes a secret; the factories are situated in the interior of the country, and the ware sold to foreigners in the seaport towns. Then, again, Chinese porcelain, although always carefully marked with the date of the manufacture, never bears the maker's or factory mark. This renders it almost impossible to classify the ware according to manufacture, especially as it is a common practice to decorate the ware at a different factory from the one where it was made. For these reasons Chinese porcelain is classified according to age into thirty different periods, covering about five centuries.

The blue ware, best known as Nankin, is made at the factory of King-to-Ching, one of the largest in the empire. The rich decorations in green and gold come mostly from Hong Kong.

Japan.—The Japanese have adopted a very liberal policy, precisely the opposite of the Chinese. Their wares are almost always marked with the maker's name, in addition to the town and province where they are made. The date

is sometimes added, Chinese fashion. Every facility has recently been extended to American chemists and manufacturers to inspect the factories and analyze the clays and glazes used in the manufacture.

Most of the potteries are small; in some towns the ware is burned in public ovens, the potters making and ornamenting their work at their homes. This accounts for the wonderful diversity of pattern, color and form that may be noticed in the various Japanese wares. Recently they have taken to copying European shapes and decorations, generally with results not to be commended in an artistic point of view, though they have furnished us with more convenient and practical shapes.

The principal varieties of Japanese porcelain are the Hezen and Kaga. The Hezen factories are the larger and more important, and produce a ware of a hard white body and clear and even glaze. The decoration is varied, though on most of the pieces red predominates. The Arita ware is very delicate, and at Owari is decorated under the glaze with a rich blue. The celadon ware, with a peculiar mottled green glaze, is made here, and the egg-shell porcelain of Hirado is very celebrated.

The Kaga ware is yellowish porcelain usually decorated in a rich dark red and gold. It is sometimes called Kutani, "the nine valleys," from the location of the factories of the Prince of Kaga.

The Banke ware is a coarse stone-ware, usually modeled by hand and unglazed, and decorated with flowers in enamel colors.

Kioto, Awata and Satsuma pottery is of a delicate cream-color, finely crackled. The Satsuma is the paler, being of a lemon color, and is generally decorated with gold and a little color. This ware is one of the most expensive varieties made, and is in great demand.

The Awata earthenware is very hard and close-grained, and sometimes ornamented with characteristic designs of birds, flowers, etc., in low relief, richly colored and gilt.

Kioto ware is the commonest sort of Japanese pottery. Birds, flowers and insects are the usual patterns, and the ornament is often in raised enamel.

The Japanese apply cloisonné enamel upon Awata earthenware and also upon porcelain, in the following manner. The pattern is outlined on the vase with brass wires; these are fastened, and in the cloisons, or compartments, thus formed is placed the enamel, the different colors ranged as may be desired to produce the right effect. The piece is then fired, to do which without injury to the vase is a very delicate, opera-

tion. If any cracks are left they are filled with enamel and re-fired, until the surface is free, when it is polished down until a perfectly even surface is attained. This ware is the most difficult to manufacture of any modern variety.

United States.—In the United States the manufacture of the commoner kinds of earthenware and pottery is already firmly established, and a heavy sort of porcelain is made, but very little progress has been made toward the manufacture of an artistic pottery.

There are sixteen great pottery establishments in Trenton. It is only about twenty-five years ago that the first pottery was established, and it is there yet. It made only yellow or rockingham ware. Other potteries started out to make only yellow ware, but the grades of goods made in Trenton improve every year, and there is now only one yellow-ware pottery there. East Liverpool, Ohio, is the great center of yellow-ware manufacture. It is nearly as great a pottery center as Trenton. Among the workmen are many Englishmen and Irishmen, but Americans are learning to do good work. There are designers and decorators from Minton's great English tile-works and from Tiffany's in New York, employed to decorate the better grades of toilet and table ware.

A little while ago nothing better than cream-colored stone-china, and blue-stone and stone-porcelain ware was made in Trenton. Now there are establishments that make real china, and others that manufacture a grade of stone-china that they claim looks as well and wears better than French china, and is the same in everything except that it is not translucent. This translucent quality is obtained by intense "firing," and those who do not make "real" china say that this "firing" spoils a large proportion of the goods. Those who do deal in the fine work claim that by "firing" the china just as earthenware is fired—that is, by putting many pieces together, where the French put only one piece—there is a tremendous profit at lower prices than the French obtain. The trouble is, however, that the French goods, in standing alone in the firing-boxes, receive no blemish, while the American ware, which is stacked up on pegs, in the boxes, bears the marks of the pegs.

Although we do not manufacture artistic pottery ourselves, this country is fast becoming one of the best markets in the world for the sale of this class of goods. The increased taste for these art-products, is traceable in a large measure to the Centennial Exposition, but as much credit is due to those importers and dealers who keep in their stores and art-warerooms a constant exhibition of ceramic art.

GLASS; SILVER-WARE; BRONZES.

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GLASS.

Some Properties of Glass.—Glass has properties peculiarly its own. It is of no greater bulk when hot, or in the melted state, than when cold. Some writers state that it is of greater bulk when cold than when hot. It is transparent in itself; though the materials of which it is composed are opaque. It is not malleable, but in ductility ranks next to gold. Its flexibility, also, is so great that when hot it can be drawn out, like elastic thread, miles in length, in a moment, and to a minuteness equal to that of the silk-worm. Brittle, also, to a proverb, it is so elastic that it can be blown to a gauze-like thinness, so as easily to float upon the air. The elasticity is also shown by the fact that a globe hermetically sealed, if dropped upon a polished anvil, will recoil two thirds the distance of its fall, and remain entire until the second or third rebound. (The force with which solid balls strike each other may be estimated at ten, and the reaction by reason of the elastic property at nine.) Vessels called bursting glasses are made of sufficient strength to be drawn about a foot; a bullet may be dropped into one without fracture of the glass; even the stroke of a mallet sufficiently heavy to drive a nail has failed to break such glasses. In a word, ordinary blows fail to produce an impression upon articles of this kind. If, however, a piece of flint, cornelian, diamond, or other hard stone, fall into one of these glasses or be shaken therein a little while, the vessel will fly into a myriad of pieces.

Prince Rupert Drops.—Glass of the class called Prince Rupert drops exhibits another striking property. Let the small point be broken, and the whole flies with a shock into powder. Writers have endeavored to solve the philosophy of this phenomenon; some by attributing it to percussion putting in motion some subtle fluid with which the essential substance of glass is permeated, and thus overcoming the attraction of cohesion. Some denominate the fluid electricity, and assert that it exists in glass in great quantities, and is capable of breaking glass when well annealed. These writers do not appear to have

formed any conclusion satisfactory to themselves, and fail to afford a well-defined solution to the mystery.

Other Properties.—Glass is used for pendulums, as not being subject to affections from heat or cold. It is, as is well known, a non-conductor. No metallic condenser possesses equal power with one of glass. In summer, when moisture fails to collect on a metallic surface, open glass will gather it on the exterior; the slightest breath of air bringing moisture upon the glass. Dew will affect the surface of glass, while it has no apparent result on other surfaces.

The properties of so-called "musical glasses" are strikingly singular. Glass bowls partly filled with water, in various quantities, will emit musical sounds, varying with the thickness of their edges or lips. When rubbed, too, with a wet finger, gently, the water in the glass is plainly seen to tremble and vibrate.

Bells manufactured of glass have been found the clearest and most sonorous; the vibration of sound extending to a greater degree than from metallic bells.

Glass resists the action of all acids except the "fluoric." It loses nothing in weight by use or age. It is the most capable of all substances of receiving the highest degree of polish. If melted seven times over and properly cooled in the furnace, it will receive a polish rivaling almost the diamond in brilliancy. It is capable of receiving the richest colors procured from gold or other metallic coloring, and will retain the original brilliancy of hue for ages. Medals, too, imbedded in glass can be made to retain forever their original purity and appearance.

Another singular property of glass is shown in the fact that when the furnace, as the workmen term it, is settled, the metal is perfectly plain and clear; but if by accident the metal becomes too cool to work, and the furnace heat is required to be raised, the glass, which had before remained in the open pots perfectly calm and plain, immediately becomes agitated or boiling. The glass rises in a mass of spongy matter and bubbles, and is rendered worthless. A change is, however, immediately effected by throwing a

tumbler of water upon the metal, when the agitation ceases and the glass assumes its original quiet and clearness.

Its Antiquity.—No writer upon the subject of glass manufacture has shown anything decisive as to the precise period of its invention. Some suppose it to have been invented before the flood; others trace its antiquity to the yet undetermined time of Job.

It seems clear, however, that the art was known to the Egyptians 3500 years ago; for records handed down to us in the form of paintings, hieroglyphics, etc., demonstrate its existence in the reign of the first Usurtesen; and existing relics in glass, taken from the ruins of Thebes, with hieroglyphical data, clearly place its antiquity at a point fifteen centuries before Christ.

Layard, in his discoveries among the ruins of Nineveh and Babylon, says: "In this chamber were found two entire glass bowls, with fragments of others. The glass, like all others that come from the ruins, is covered with pearly scales, which, on being removed, leave prismatic, opal-like colors of the greatest brilliancy, showing, under different lights, the most varied tints. This is a well-known effect of age, arising from the decomposition of certain component parts of the glass. These bowls are probably of the same period as the small bottle found in the ruins of the northwest palace during the previous excavations, and now in the British Museum. On this highly interesting relic is the name of Sargon, with his title of King of Assyria in cuneiform characters, and the figure of a lion. We are therefore able to fix its date at the latter part of the seventh century B.C. It is consequently the most ancient known specimen of transparent glass."

Other writers believe that glass was in more general use in the ancient than in comparatively modern times, and affirm that among the Egyptians it was used even as material for coffins. It is certainly true, so well did the Egyptians understand the art, that they excelled in the imitation of precious stones, and were well acquainted with the metallic oxides used in coloring glass; and the specimens of their skill, still preserved in the British Museum, and in private collections, prove the great skill and ingenuity of their workmen in mosaic similar in appearance to the modern paper-weights. Among the specimens of Egyptian glass still existing is a fragment representing a lion in bas-relief, well executed and anatomically correct. Other specimens are found inscribed with Arabic characters.

All writers agree that the glass-houses in Alexandria, in Egypt, were highly celebrated for the

ingenuity and skill of their workmen, and the extent of their manufactures.

Strabo relates that the Emperor Hadrian received from an Egyptian priest a number of glass cups in mosaic, sparkling with every color, and deemed of such rare value that they were used only on great festivals.

The tombs at Thebes, the ruins of Pompeii and Herculaneum, and the remains of the villa of the Emperor Tiberius, go not only incidentally to establish the antiquity of the art, but also prove the exquisite taste and skill of the artists of their various periods.

First Glass-Houses.—The first glass-houses, well authenticated, were erected in the city of Tyre. Modern writers upon the subject generally refer to Pliny as establishing the fact, that the Phenicians were the inventors of the art of glass-making. The tradition is that the art was originally brought to light under the following circumstances. A vessel being driven by a storm to take shelter at the mouth of the river Belus, the crew were obliged to remain there some length of time. In the process of cooking, a fire was made upon the ground, whereon was abundance of the herb "kale." That plant burning to ashes, the saline properties became incorporated with the sand. This causing vitrification, the compound now called glass was the result. The fact becoming known, the inhabitants of Tyre and Sidon essayed the work, and brought the new invention into practical use. This is the tradition: but modern science demonstrates the false philosophy, if not the incorrectness, of Pliny's account; and modern manufacturers will readily detect the error, from the impossibility of melting silex and soda by the amount of heat necessary for ordinary boiling purposes.

From Tyre and Sidon the art was transferred to Rome. Pliny states that it flourished most extensively during the reign of Tiberius, entire streets of the city being then occupied by the glass manufactories. From the period of Tiberius the progress of the art seems more definite and marked, both as relates to quantity and mode of manufacture.

The Art under Nero.—It was during the reign of Nero, so far as we can discover, that the first perfectly clear glass resembling crystal was manufactured. Pliny states that Nero, for two cups of ordinary size, with handles, gave six thousand sestertertia, equal in our currency to about two hundred and fifty thousand dollars; and that rich articles of glass were in such general use among the wealthy Romans as almost to supersede articles of gold and silver. The art, however, at that period seems to have been entirely devoted to articles of luxury, and, from the great price paid, supported many establishments—all, however, evi-

dently upon a comparatively small scale, and confined, as it would appear, to families.

Up to this period no evidence appears that any other than colored articles in glassware were made. It is clear, too, that the furnaces and melting-pots then in use were of very limited capacity, the latter being of crucible shape; and it was not until the time of Nero that the discovery was made that muffled crucibles or pots, as at the present day, were required to make crystal glass. (Without them, it is well known, crystal glass cannot be perfected.) It appears, further, that a definite street in the city of Rome was assigned to the manufacturers of this article, and that in the reign of Severus they had attained such a position, and accumulated wealth to such a degree, that a formal tax was levied upon them. Some writers take the ground that this assessment was the primary cause of the transfer of the manufacture to other places.

That the peculiar property of the manufacture at this period was its clear and crystal appearance is abundantly evident; and this, and the great degree of perfection to which the manufacture of white or crystal-like glass was carried, are by many writers thought to have been proved from classical sources—Horace and Virgil both referring to it: the one speaking of its beautiful luster and brilliancy, the other comparing it to the clearness of the waters of the Fucine Lake.

Venice becomes its Seat.—The decline of this art in Rome is clearly defined by various writers, and its gradual introduction into Bohemia and Venice is plainly marked out. At this latter place the art flourished to a remarkable degree, and, being marked by constant progress and improvement, enabled Venice to supply the world without a rival, and with the beautiful manufacture called "Venice drinking-cups." The beauty and value of these are abundantly testified to by many authors, among whom is Holinshed. The manufacture of these and similar articles were located, as stated in the "Chronicles," at Murano, a place about one mile from the city, where the business assumed a high position among the arts. And from thence we are enabled to date its future progress and gradual introduction into Europe, Germany, England, and the western world.

It is not strange that the strict secrecy with which the business was conducted in these times should have invested the art with an air of romance; and legends, probably invented for the purpose, created a great deal of wonder among the uninitiated. The government of Venice also added by its course to the popular notions regarding the high mystery of the art, conferring as it did the title of "gentleman" (no idle title in those days) on all who became accomplished in the manufacture. That the art had greatly im-

proved in the hands of the Venetian artisans cannot be doubted. The manufacture was carried to a degree far beyond any previous period; and the more so because sustained by governmental protection and patronage. Venice being then in the height of her commercial glory, the "Queen of the Sea," ample facilities existed for the exportation of her manufactures to every part of the known world; and for a long period she held the monopoly of supplying the cities of Europe with crystal glass in its various departments of ornament and utility.

Decorated Table-Glass.—If anything can reconcile the possessors of small incomes to the fact that certain luxuries are entirely out of their reach, it may well be found in the care their possession entails. Take for example the costly glass and porcelain, the fragile vases and tearware, which call for so much care upon the part of those whose business it is to look after them. It is bewildering to consider how many varieties of table-glass there are—Bohemian, Hungarian, English, American, to say nothing of polished, crystal, engraved, colored and painted glass.

What a value the world sets upon table-glass may be gathered from the fact that a French writer estimates that at the present time over 100,000,000*f.* are expended in it yearly, and a glance at the large glassware stores in New York is sufficient evidence of the demand among ourselves. Rarely have more beautiful specimens of foreign and domestic manufacture been seen. They may vie with those sent to special exhibitions as evidence of national progress in the art. The most noticeable feature, perhaps, of the trade, as regards this country, is the fact that so great is the demand that glass of every variety is imported here in a crude condition and finished by polishing, engraving or cutting by foreign artists in glass resident here.

Great interest attaches to the many varieties now in fashion. Among them choice Venetian, Bohemian and Hungarian ware are most noticeable. From Italy, as all the world knows, the secret of perfecting table-glass came. How it found its way to other countries is lost in conjecture, and to-day the artist in glass at Murano will reproduce any old specimens of antique Venetian glass that may be set before him. Most of the filigree glass, which is so very beautiful, is a revival of an old Italian art. Small filigree canes of white and colored enamels are drawn off the required length, arranged in clusters in a cylindrical mold of the desired shape, and then fused together by heat. In this way glass of every kind is decorated. An eye-witness describes the method by which the antique specimens of Venetian glass are imitated.

Imitation of Antique Glass.—Suppose a wine-

glass to have been selected, with deep bowl, initial stem, and broad, ruby-tinted foot—such a one as a connoisseur would deeply prize. The artisan who undertakes to copy it proceeds as follows: Dipping a hollow iron rod into a pot of molten white glass he catches up a lump, rolls it on an iron slab, pops it into a furnace, blows through his rod, and tosses it aloft, when a hollow tube appears. Then, with a rod of metal in which melted glass is twisted, he, quick as lightning, forms the initials as on the original. The foot is next as rapidly formed of white glass, and with a scrap of molten ruby glass, which the artisan blows to a hair, and binds around and around the rim of the bowl and of the foot, the transaction is completed, saving for the burning, which will continue in a moderately heated oven till the morning. Cut glass is becoming as fashionable in this country as any of the colored or filigree wares, and its manufacture is now successfully carried on here to such an extent that American cut glass can compete with that of long-established foreign manufacture.

Exquisite Ware To-day.—Among the most beautiful specimens of table-glass found to-day, that from Hungary is as valuable as any. Exquisite in form as well as in color, it is essentially decorative. Moreover, many of the designs are quite novel, and are specially made to suit the taste of the American buyer. The latest for finger-glasses is in square shape, the edges rolled back and finished in gilding; flat saucers accompany these fragile bowls. Champagne-pitchers, too, come from Hungary and Vienna, and frosted ice-pitchers, more beautiful even than those of polished or enameled surface, are seen on wealthy tables. Exquisite Bohemian glass is enameled in gold and silver, and by a recent invention the design wrought in gold or silver is incorporated with the glass itself, and thus not only decorates the surface but radiates through it. Many of the most beautiful services of glass are decorated in raised medallions; others are engraved in half-relief, and a set of rare glasses will carry out a legend or story, each glass containing one scene or act. Punch-bowls of deeply cut crystal are exceedingly handsome, and probably no center-pieces or flowers have ever been as popular as those now prevalent of deeply cut crystal, every knob of an intricate design, flashing with light. Lustres of cut glass too are found upon the modern dinner-table, a revival of an old fashion which adds greatly to the effect, and candelabra, with cut crystal pendants, twinkle and glitter in the artificial light. Glasses of different color figure upon well-appointed tables, indicating to the initiated what wines and liquors may be expected. Liquor bottles and glasses are of the most deli-

cate Bohemian or Hungarian ware, while even for less luxurious occasions modern table-glass shines with polish and enamel and reflects in delicately cut flutings the artistic ambition of the day. A table laid in accordance with the dictates of fashion may well vie with anything that the past has produced, and it would be scarcely possible for a royal household in Europe to exhibit rarer or more beautiful specimens of table-glass than may be found in wealthy mansions in this country. Exorbitant prices have been paid for such—\$1000 for a single center-piece in antique Venetian glass, \$7000 for a set of antique wine-glasses, to say nothing of sums asked and paid for odd glass dishes and bowls. Finger-glasses to-day are of colored glass, translucent blue or delicate green or amber, unless, as in some instances, cut, gilded or enameled varieties are preferred. The old-fashioned goblet has followed the tankard, and appears no more in our midst; but in many an English home the host will have a goblet, "high in stature, fair in make," for himself, an honorable token of his standing, which has been handed down for many generations.

SILVER-WARE.

America goes ahead.—The extent to which art-work in gold and silver has developed in this country within the last ten or a dozen years is but little known or appreciated outside the trade, although the results of this artistic and commercial growth are to be seen in almost every household.

Silver-Plating.—Years ago the market for silver-plated ware in this country was held by the goods manufactured in Sheffield, England. They were sold as the highest grade of goods, and were put forth by the dealers as something which could scarcely be approached by domestic manufacturers. Their quality was good, but the styles were limited to a few designs, and their prices were too high to admit of their general use. Then came the every-day ware of our large manufacturers, which was sold at popular prices, and went all over the country, even into the backwoods. The cheapness of the American makes enabled the buyers to get new styles as soon as the articles began to wear out, and thus a taste for novelty in designs was stimulated. Taking advantage of this, and constantly improving their work, the American manufacturers made no efforts to obtain "protection" against their Sheffield rivals by means of tariff exactions, but depended on outstripping them by superior enterprise. As a result the Sheffield ware is now scarcely to be found in this market—its designs being so few and so uncouth, in comparison with the American, that our buyers will not look at

them. The American people have been educated by the native manufacturers to a higher degree of taste in silver art-work, and all of the best designs in sterling metal are closely copied in the plated articles. The latter, as a rule, are plated upon soft metal, costing only about one fourth as much as the English hard-metal ware, and therefore can be replaced by new patterns at least once in ten years. Only one American firm makes hard-metal plate, which will last a lifetime, and is largely used for communion-services. It is especially suitable for that purpose, as solid silver in churches is always exposed to the danger of theft. The enterprise of the American makers is indicated by the fact that a single manufacturing company has at one time spent \$30,000 in publishing volumes of illustrations of its series of designs in plated ware alone. The efforts of such firms have placed in the possession of nearly all classes of our people the forms of art-work in metal which in Europe are confined to the wealthy and privileged few. Even workmen here eat with silver-plated forks, while men of the same social grade in Europe never saw such articles unless in a jeweler's window.

Solid Silver.—In solid silver-ware the improvement and success of the American manufacturers have been as marked as in plated goods. At one time coin silver was much used for table-services, but the large proportion of alloy in American coin gave rise to still further debasements. An instance is recorded of a maker who stamped his productions "coin silver, with but one per cent alloy," and who was proved to have used one of the old-fashioned large "coppers" with every ninety-nine cents in silver. Trickery of this sort could not withstand exposures by honest manufacturers and the demand of intelligent buyers for genuine goods. All American solid silver is now made of sterling fineness, equal in quality to the English hall-marked plate. In the manufacture of some special pieces, such as great silver vases and trophies, for prizes or memorials, the English and French silversmiths remain unexcelled; but in silver-ware for daily use the American makers surpass all others in the beauty and variety of their designs. Their service in educating the taste for art among the people of this country has been of the most important character. A few years ago one manufacturing company reproduced the masterpieces of Benvenuto Cellini in trays and tea-sets. The Russian silver-ware has been copied, and its damask work excelled. The Chinese and Japanese styles of ornamentation have been imitated in their most grotesque effects, but this tendency to gratify a popular whim for monstrosities is declining, and in general our makers

show but little disposition to stray from the principles of classic art. Most of the American designs are original, when not copies of the triumphs of the old master-craftsmen. Remarkably fine effects are produced in engraving and chasing, and also by hammer-finish, although the exquisite leather-finish is taking the place of the latter. A novel style, just introduced, is the border ornamentation of silver by very pretty little rustic scenes and figures, illustrating familiar nursery-songs.

Improved Machinery.—The American manufacturers have introduced methods of simplifying and expediting work by the use of machinery, employing handwork for all the processes of finishing. They draw the best workmen from Europe by paying the highest wages, and they also in the large establishments educate young Americans to a wonderful degree of skill in special branches of designing and the production of mechanical effects. In one well-known house the task of producing a certain new and beautiful effect in silver was assigned to an American youth, and the old English and French workmen there laughed at the idea, saying that the attempt had repeatedly been made in Europe without success. The young workman locked himself in his room and studied, and the result was his complete triumph over the difficulty which had so long baffled silversmiths. So great is the aptitude shown by the best American workmen that persons familiar with it express a strong desire for the establishment of art-schools here, such as are maintained in Europe, in order that native talents may be developed under the most favorable circumstances. It is suggested that our leading manufacturers would do well to offer prizes for designs by their workmen, and thus give a stimulus to artistic ambition which would still further elevate the standard of the trade.

American Export Trade.—American silver-ware is now exported in considerable quantities to Australia and the various countries of South America, and only the hall-mark restrictions in England prevent its finding an extensive market there. The hall-mark stamped on all plate in England by the goldsmiths' companies as a guarantee of its quality is a collateral assurance of its fineness, but not an absolute safeguard, as various tricks are resorted to in order to evade the law. American makers, having a ready market here, cannot afford to incur the trouble and the detention of their goods by the assayers and markers which are preliminary to sales in England. Besides this, the silver is often mutilated in the marking, and in some cases has been sent back here to be refinished. The hall-mark system would be impracticable in this country, where, in the city of Newark alone, a hundred

thousand different pieces of jewelry are manufactured every day. The amount of labor and time which would be required for testing and marking all the gold and silver articles produced here can scarcely be imagined. It is said, however, that a law of Congress is needed, establishing a standard for wrought gold, the same as for weights and measures, so that goods stamped "fourteen carats" shall be fourteen carats fine, and not ten. Such a law, it is argued, would not only tend to protect the buyer, but would be of great benefit to respectable manufacturers, who are now exposed to dishonest competition.

BRONZES.

Their Constituents.—What is known as bronze is, of course, a compound of copper and tin; and yet this is not an exact definition, for the bronze of art contains also an admixture of zinc and lead, rendering it at once harder and more fusible than copper itself, and, more curiously still, more malleable. Its remarkable durability, the fineness of its grain, its resistance to moisture, its fusibility, and that "fluidity" which enables it to be stamped by an impression of the most delicate forms and patterns, constitute it the sister in art, as it were, of marble. To the ancients it was invaluable. They applied it to the uses to which are now applied iron, steel and brass. In our times, however, it is chiefly devoted to the fabrication of cannon, coin, clocks, cymbals, bells and the inferior constructions of telescopes; and, in application to each and all of these, the alloy requires to be different. For art purposes from seven to ten per cent of tin and copper is the prescribed proportion, although the ancients used more, while the famous founders of Corinth threw in, often, a mixture of silver, and even gold, and were imitated by the master-workmen of the Renaissance. In the seventeenth century the brothers Keller, who attached to the mere composition of bronze an importance which their less intelligent rivals discarded, used, in the statues they cast for Versailles, a strong mingling of zinc and lead, precisely similar to that which the Chinese employ in the fabrication of their metal drum-heads. Since then the art has much degenerated, however. It has ceased to be an exclusive enjoyment of the rich. Luxury in France, as elsewhere, has taken its place among the habits of the middle classes, or less wealthy classes, properly speaking, and objects of art are common in bronze—that is, in zinc; in compositions merely colored to resemble the authentic material, of which the cost has never diminished, and is even increasing.

The Vendôme Column.—The French are proud of their Vendôme Column as a historical monument; but as a work of art, they denounce it as

detestable. It was made, as is generally known, of the Austrian cannon captured at Austerlitz, which contained ten parts of tin to ninety parts of copper; but so imperfectly was the process carried out that no two plates, curled about the inner stalk of masonry, represented the same amalgamation. The different parts had been cooled at different times, and at different degrees of temperature, and the result—so Parisian critics affirm—was a *fiasco*.

Statue of Marcus Aurelius.—With reference to the previous work of the modeler, it belongs to the subject of sculpture generally, while, as to its practice among classic artists, little information has come down to us. They are only known to modern times by their perfections. The equestrian statue of Marcus Aurelius, copied at Paris, was minutely examined by MM. Saudrard and Duquesnoy, who declared that it was without a flaw, that the metal was nowhere of a thickness exceeding that of a five-franc piece, and that, although at once colossal and, to all appearance, fragile, it possessed every imaginable element of strength.

The Roman Method.—The mold was made of clay mixed with wheaten flour, which held together well, while it came to pieces easily. The Romans, however, did not attempt to complete the work by an unbroken flow from the caldron into the mold. But, whatever their system, the art was popular, for every ruined city of both Rome and Greece has given up profusely its relics in bronze, for which a rage existed. Cicero tells of a sum equal to \$1000 being paid for a figure not fifteen inches in height. In late days wax molds were employed, at an enormous expense and with indifferent success; after them, a composition of plaster; next, iron plates, jointed or riveted together and lined with "porcelain earth;" but all these artifices failed. The bronze did not take the true shape of the mold, and the artist was, in nine cases out of ten, disappointed.

The Florentine Schools.—The art seemed in danger of disappearing when the glorious Florentine schools arose, and the masterpieces of the Baptistery, of Ghiberti, Donato, and Cellini, bearing the unquestionable impress of the chisel, redeemed that which had threatened to become a lost genius in Europe. The works of Keller himself, at one time the ablest modeler in Christendom, were improved upon, retouched, softened and made more gracious by the men who owed to him much of their teaching; and he willingly retraced many a step to follow masters who, to his imagination, seemed nothing less than inspired. But that was in an age of luxury for art. Ghiberti's gates, weighing 34,000 lbs., cost 22,000 florins, a sum which would be gigantic in the nineteenth century. The Seignurie

of Florence paid Lorenzo, not with purses, but with estates. The first Francis never made a bargain with Cellini, nor did Louis XIV. with Keller. The gates of the Madeleine, on the other hand, beautiful though they are, cost less than £5000; the equestrian statue of Louis XIV. at Lyons twice that amount. These, however, do not rank as what are generally spoken of as art-bronzes, which signify rather ornaments. They may be of their natural color or gilded, though in both cases receiving an artificial tint, through the application of vinegar, ammoniacal salts, cream of tartar, sea-salt and nitrate of copper. The Florentines, nevertheless, had their secret in this respect, which no modern ingenuity or science has been enabled to penetrate. But when the bronze is to be gilded, the French founder resorts, as a rule, to what is termed the quadruple alloy—that is, copper, zinc, lead and tin—to obtain a more adhesive surface.

Among the Orientals.—As usual, these arts were found among the Orientals long before they made their appearance in the West. Countless examples of them have been discovered among the buried antiquities of Egypt. They are noted in the Scriptures; they are found, according to some, in Italy before they are found in Greece, though the testimony on this point rests, it should be observed, upon the rather apocryphal effigies of Romulus, Horatius Cocles and Clælius. Yet the Etruscans exhibited little knowledge of bronze art, while in the Ionian island of Samos the foundations of it in historic eras would appear to have been laid. In this material, it is supposed, the Laocoön first grew into form. Rhodes alone possessed a hundred Colossi of it, and the bronzes of Athens emulated her marbles. Treasures beyond valuation were exhumed from Pompeii and Herculaneum, and the museums of the South attest to the love of the older generations for this noble branch of the plastic arts—the “Mercury,” in the Museo Borbonico; the “Wrestlers,” in the same gallery—which suggested the “Pugilists” of Canova—the “Drunken Faun,” the “Sleeping Satyr,” the “Dancing Faun,” in each of which, unpromising though the substance seems, the blood seems to circulate. Naples possesses in bronze the busts of

Plato and Sappho, and once possessed the celebrated horse's head which an archbishop, taking advantage of his opportunity, ordered to be melted down and converted into a chime of bells; But the crown of all this art is the equestrian statue, already alluded to, of Marcus Aurelius Antoninus, on the Capitoline Hill at Rome. Its dignity resembles in nothing that of the bronze Louis XIV. figuring in the saddle on the Place des Victoires at Paris. It is simple, composed and magnificent. It belongs to Italy, but was the work of Greece.

French Bronzes.—In our days the monumental has been largely superseded by a less ambitious, and, so to speak, more domestic type. French-bronze, all qualifications apart, represents the art in its nineteenth-century form; upon this material ten thousand artisans are constantly at work in Paris alone, and their industry keeps afloat annually a capital of two millions sterling. Their labors are carried on in great factories or at their own homes indifferently. They are less, perhaps, the ministers of art than of luxury; but the element of taste, at any rate, is indispensable, and in this the French artificer, or he who instructs him, is rarely deficient. Besides which, the great manufacturers—for it is a manufacture after all—ransack the markets of Europe for masterpieces, whether originals, or copies, of sculptures, which they so popularize that they are presently to be seen reproduced in every drawing-room, and *salle-à-manger* of the capital. What student is without his miniature Venus of Milo; his Vatican Amazon, his Diana and Polhymnia? He might as well be without a bit of carved ebony or an ormolu clock; and that very clock must be surmounted by a group of the Three Graces or a Penelope in bronze—or bronze plaster, for to this has the traffic in taste fallen. The passion is visible, too, in candelabra; chandeliers, candlesticks, lamps, ink-stands, penholders, watch-stands and innumerable humbler articles, which, otherwise, would be produced with a thin glitter of gilt upon the poorest material. Art has, in more than one epoch, been nobly illustrated in bronze, and the French, whatever ground they have lost, are still in advance of all other nations.

COVERINGS FOR FURNITURE.

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Variety of Fabrics.—The subject of fabrics to-day is a most interesting one, not only from its practical importance to every one interested (and who is not?) in interior decoration, but as a most striking illustration of the immense development which has taken place in the upholstery trade within the last thirty years. Most of us can recall the time when the best suit of furniture was covered in reps or terry, and remember the first indication of a change when, some twelve years ago, the introduction of a novelty in the shape of raw silk or bourette tapestries awakened public interest in the possibilities of furniture coverings. Up to that time an upholsterer was in a creditable position if he could offer his customers a selection from four or five stuffs, and the choice depended almost entirely upon color and comparative value of the goods. No one expected anything better, and no one regretted the limitations of the trade. But time wrought a marvelous change. The raw-silk tapestries were the first complete innovation. They were woven from refuse silk, from the odds and ends of the cocoons, which had previously been thrown away as valueless; and although they took the public taste by storm and had an immense popularity, they proved neither serviceable nor lasting. They faded and wore shabby, and in this way educated people up to the necessity of procuring new coverings for valuable furniture, and novelty succeeded novelty, until now we find ourselves suffering from a perfect plethora of goods, a bewildering assortment of fabrics, any one of which would have excited the admiration of a former generation. To enumerate them is almost an impossibility. Of plushes alone there are many varieties, of tapestries almost as many, while silks of all kinds are in use, and miscellaneous fabrics are innumerable.

Manufacture of Plushes.—To begin with plushes, the common variety known as mohair plush is but little used in modern houses; it serves, however, largely for the covering of railway cars, and is made of goat's hair, costing about \$3 to \$4.50 a yard. It is imported from Amiens in large quantities. Next in value comes plush of German make, which is not very popular on account of want of nicety in finish. Silk plushes, on the contrary, are in great and steadily increasing demand for the reason that they produce richer effects than any other material of the same value, viz., from \$3 to \$6 a yard. But, although there

is so decided a preference shown for them, there is every probability that in time jute and linen plushes will largely supersede them. Plain jute plushes which run 50 inches wide cost from \$4.50 to \$6, the figured varieties from \$5 to \$7, and those that are now most novel, embroidered, in gold thread, from \$8 to \$11 a yard. The preparation of figured jute plushes is full of interest. These fabrics are all of French manufacture, and one of the largest firms supplying them for the New York trade has its factory in a suburb of Paris. Surrounded by a high wall, and almost screened from sight by lofty trees, it is an immense building, portioned off into rooms 20 feet wide by 100 long, in which the material, after its manufacture, is printed in colors. Down the center of each room run long tables, and upon these the material is tightly stretched. Parallel with them run car-tracks upon which cars are constantly propelled back and forth by small boys and girls, who are in constant attendance upon the artisan who stands behind the table with wooden blocks upon which the designs to be carried out are carved. The cars contain the colors, which are already prepared for use, and as the printer needs them he calls or signals the boys, and, as they run the car up to him, dips his wooden block into the color and stamps it at once in the proper spot upon the material. Tapping it four times, he removes it with care and takes the next. A dozen such blocks may be used in one design, and it would be difficult to imagine anything uglier than the material as it appears fresh from the printing process. The solid color for the ground is rubbed in with a rag dipped in moist color, and then the piece passes out of the room to be "finished," and is scarcely recognizable after that process has been completed. The embroidery is next attended to, and the chain of gold and silver thread, which gives the design the appearance of appliqué, is rapidly carried out by machinery. The great value of jute plush lies in its softness and pliability. It falls into such graceful folds that as drapery it is quite unequaled, and it is more and more in vogue for high-class trade.

Turcomans.—The designing of another fashionable material, known as Turcoman, is a still more fascinating operation. Every one is familiar with the beautiful Oriental effects which are produced in this material; but probably very few know how such results are obtained. This fa-

abric is made of raw silk in the first instance, and, if dissected, will be found to be composed of chenille strands closely woven upon a cotton warp. The design to be carried out in the manufacture is printed upon cardboard in vivid colors, in squares, like patterns for canvas-work. The design, however, is divided into sections, each perhaps an inch wide, and the first thing that is done with it is to cut it up into strips, each strip being given to a different workman. The weaving of the raw silks then commences, the artisan faithfully copying each color in his strip; for example, weaving first an inch of red, then two of yellow, again blue, and so on until the piece, he has in hand is complete. No sooner is it woven than it is placed in a machine stretched upon a revolving drum, and literally cut up into shreds by dozens of pointed knives. The shreds are drawn out and wound upon spools, forming the chenille, which in due time will become Turcoman cloth, for the various spools, each numbered, are now used for weaving the material in a frame supplied with cotton warp, from which it issues complete in all the beauty of an Oriental-looking fabric in intricate design of intermingling colors. This, too, is a manufacture which is most successfully carried on in France, and the Turcoman supplied to this country is all derived from that source.

Tapestries.—When we come to a consideration of tapestries, we find many qualities and varieties in this favorite material, varying in value according to the fineness of the worsted, the amount of material needed, and the time necessary for the completion of the design. In some of the finest tapestries in imitation of antique designs, which are known as broché tapestries, the threads are tied at the back, and this necessarily involves a very great deal of labor and time. Palaces and churches throughout Italy, Spain and France have been ransacked for designs, and great value attaches to any new discovery, which, after years of rummaging, does not take place very frequently. But there are always the standard antiques. Just now those of the time of Henri II. are in special favor, but people have, in a measure, to be educated up to a knowledge of tapestries, and purchasers are often compelled to rely entirely upon the statements of the importers. Most of the tapestries of the finer grades are made at Nîmes, in the south of France; ordinary varieties at Roubaix, a large manufacturing town. Silk stuffs, satin damask and broché, which is less used now than formerly, are imported from Tours and Lyons.

High-Priced Materials.—For very fashionable drawing and reception rooms silk velours are used perhaps more largely than any other material. Indian and Persian rugs are employed for

the covering of lounges, but only to a limited extent; such styles are not likely to become generally fashionable, one reason being that they can be copied in cheap goods. Just as a few years ago great interest was felt in the novel use of saddle-bags as chair coverings, until the market was flooded with cheap imitations of these unique materials, when they at once lost all favor for high-class importers. For up-stairs rooms, bed-chambers and guest-rooms, printed cotton fabrics are in increasing demand. The public generally call all the varieties of these materials by the common name of cretonne, but to the trade cretonne is the very poorest of printed muslins. Superior goods are known respectively as French toile-à-voile, as being in substance and quality imitative of sail-cloth, crêpe, which is a cotton fabric not unlike momie-cloth, moquette or ribbed stuff, in imitation of tapestry, and a new material which has suddenly become generally fashionable, and which is extremely handsome, and known as reps gobelens. For country houses, these various fabrics are in use even in the reception and living rooms, while in the best city houses they are in universal use for up-stairs rooms. The better class is fifty inches wide; prices vary according to quality, color and variety of design, beginning at 75 cents and often reaching a value of \$2.50 a yard. They come, with very few exceptions, from Alsace, where the old French industry is kept up.

More Economical Fabrics.—For ordinary wear in houses where economy is a necessity coverings for soft-tufted bedroom furniture are often made of a material known as fern-cloth, which is all worsted, with a small design of maidenhair-fern. This is an essentially practical material, wearing well, and procurable in all neutral colors. It costs about \$3.50 a yard and is 50 inches in width. For drawing-room hangings, where rich effects are wanted and economy is a consideration, Spanish satin is a very handsome material. It is manufactured in imitation of old satin, and is pliable and hangs in most graceful folds; and that is a point which is assuming more and more importance as people become more alive to that which really constitutes artistic effect. The preference to-day is for solid colors, excepting in the case of tapestries, the high-class furnisher relying for harmony of effect rather upon combinations of materials than variety of design. Tapestries are procurable with square designs expressly adapted for the backs and seats of chairs, which can also be obtained in silk plushes embroidered in twisted silks.

India Pongee.—In considering fabrics, these stuffs are important, and are assuming a great part in decoration, mainly because they hang so satisfactorily. Madras and crete muslins, for

example (which probably first became popular as supposed Oriental fabrics, whereas they are all made in Glasgow and never saw the East), are more and more in demand. For book-case curtains, vestibule and sash curtains there is a new and very beautiful material just brought into the market, known as India pongee, which is made of Japanese silk. It is not only beautiful in texture, but takes color admirably, and looks exceedingly well in self color, while the design upon the figured qualities is specially beautiful in imitation of Eastern grasses, flowering and in seed. It costs \$2.50 a yard and is 24 inches in width, and is reversible.

Growth of the Business.—All the goods we have enumerated are imported, but there is a class of material of domestic manufacture which is very much in demand. Algerian stripes of every variety are made in this country, either in plain or fancy fabrics, and with or without the addition of tinsel. In this line the American manufacturer has achieved a decided success, but as for competition with the European manufacturers of plushes, tapestries and silks there is little that is encouraging to say. It is impossible for manufacturers whose sole market lies in this country to compete with those who command the markets of Europe. A French manufacturer can afford to sink enormous sums in the preparation of a novel design, confident that if it fails of popularity in one country it will secure a welcome in another, and thus it comes to pass that fortunes are invested in the factories of France,

while enterprise here is forced to rest content with the effort to supply goods of less expensive quality which will find a market among the general public. No class have so much reason to feel grateful for the modern decorative movements as the importers of upholstery goods to-day. Their business has not only grown enormously, but undergone a vital change. Formerly, as we have seen, the furniture-dealer supplied the necessary choice of material for the coverings of the furniture he sold; but to-day, when 1500 or 2000 varieties of material are carried by one house, no small dealer can possibly provide the expected choice for his customers, and hence it has become usual for a furniture-dealer to send his customer to some high-class house for the selection of materials, and as a necessary result the importer secures not only a large wholesale trade which is his by right, but an increasing retail trade which has arisen out of the increasing demands of the public taste.

Leather.—Much could still be said of leather—plain, soft, embossed and gilded—as covering for furniture, but we must content ourselves with the remark that in the highest circles this material is used only in dining-rooms and vestibules, no longer in libraries, where tapestries and plush have superseded it, and never in up-stairs rooms. Astonishing as it may seem, there is still a demand for horsehair coverings, although it is mainly from country towns. The cities, as a rule, repudiate it.

PIANO-FORTES.

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PIANO-FORTES: THEIR SELECTION AND CARE.

The Selection of a Piano.—This involves more points than is generally supposed. The first point for consideration is, What use is to be made of the instrument? Is it to be used for educational purposes? If so, the best is always the cheapest. This is emphatically true in the point of the development of the ear, for no ear can be perfectly developed unless it uniformly hears good tones. Then, the action of an inferior instrument is a constant check to any facility in the education of the fingers. This is abundantly illustrated in the case of an artist's performance on a grand, a square or an upright piano, the use of the first

affording an ease of execution that a square or upright can never give, or only to a limited extent. Last, but by no means a small consideration, is the fact that a piano in constant use needs to be of the very best quality in every particular, to stand the demands made upon it.

Desiderata.—Having taken these points into consideration, then, we find that a piano, for study, should be of the purest tone for the development of the ear, of superior action for facility in execution, and the less complicated in construction the surer of standing the wear of time.

The Grand.—Only in the grand pianos are found what is wanted: the mechanism is the least complicated; the double repeating action is of inestimable advantage to the player, as is also the

movable action, which makes beautiful effects in soft playing possible; and a depth of power that can be brought out from neither a square nor an upright.

The Baby Grand.—The small-sized grand piano now so much manufactured contains all the good qualities of the large size, and is well adapted to most parlors.

Avoid the Upright.—To return to the subject of selection. If the piano to be selected is not for a student, some of the requirements then necessary may be set aside. Many square pianos will supply all that is demanded of them in houses where they are only used occasionally. Upright pianos, except under exceptional circumstances, should not be bought. In many cases the smallness of rooms influences purchasers to choose an upright, which if the comparative merits of pianos were understood could not be the case. A grand piano will outlast two squares or three uprights.

The Reason Why.—It may be asked, Why is not an upright piano as good as a grand or square? The answer is, that the mechanism in an upright is so complicated that it is certain to get out of order very easily, and is not so readily repaired as a less intricate instrument. It also gets out of tune quicker, and if much used in that state is more permanently injured than other styles of pianos. This is abundant reason why upright pianos should never be taken to the country unless good tuners and regulators are at hand.

Examine only from Good Makers.—In selecting a piano only well-known and reliable houses should be visited. To the excellence of an instrument good materials are indispensable. Small and poor manufacturers are less likely to keep a stock of wood on hand that is thoroughly seasoned, for it takes fully three years for this process. Never choose a piano for sweetness or sparkle and brilliancy, as it will soon grow thin and wiry. A large powerful tone contains all possibilities.

Tuning.—Every piano should be tuned at least four times a year, and when new every six weeks for the first year. A piano not kept in tune soon loses its beauty of tone, and it is almost impossible to bring it back. The position of a piano in the room should be where the temperature is the most even, as pianos feel sudden heat or cold acutely.

Keeping the Case Polished.—The case of a piano may be as satisfactorily polished by a strong woman, as by a professional polisher. Wring a soft cloth out of as hot water as the hand will bear, wash a small portion of the surface and polish immediately with a chamois. The water should be changed frequently, and any bruise may be rubbed with a little furniture-oil.

HINTS ON PRESERVATION.

If the piano is to remain in good order for many years, good care must be taken of it. The instrument should be closed when not in use, in order to prevent the accumulation of dust, pins, etc., etc., on the sound-board; however, it must not be left closed for a period of several months or longer, but be opened occasionally, and the daylight allowed to strike the keys, or else the ivory may turn yellow.

Any hard substance, no matter how small, dropped inside of the piano, will cause a rattling, jarring noise.

In every case an india-rubber or cloth cover should protect the instrument from bruises and scratches.

The piano should not be placed in a damp room, or left open in a draft of air—dampness is its most dangerous enemy, causing the strings and tuning-pins to rust, the cloth used in the construction of the keys of action to swell, whereby the mechanism will move sluggishly, or often stick altogether. Continued dampness will also injuriously affect the varnish by swelling the wood of the outside case. It will also swell and raise the soft fibres of the sounding-board, thereby forming ridges, which by the inexperienced observer are mistaken for cracks, while really affording the best proof of excellent, well-seasoned material. All this occurs chiefly in the summer season, and the best pianos, made of the most thoroughly seasoned material, are necessarily the most affected by dampness, the absorption being more rapid. Extreme heat is scarcely less injurious. The piano should not be placed very near to an open fire or a heated stove, nor over or close to the hot air from furnaces now in general use.

Moths are very destructive to the cloth and felt used in the piano, and may be kept out of it by placing a lump of camphor, wrapped in soft paper, in the inside corner, care being taken to renew it from time to time.

MANUFACTURE OF PIANOS.

Great Improvements effected by American Ingenuity.—The fact that American pianos are now, and have been for the last twenty years, superior to those made in Europe is undisputed, and the great pianists of the world use them with high satisfaction not only during their visits to this country, but at their own homes. That no essential improvements in piano-making have been made by European manufacturers during the last thirty years was evident at the Paris Exhibitions of 1867 and 1878, when the pianos exhibited by Europeans could not compare with American products. A reporter of an evening paper who

had occasion to visit several piano-forte manufacturers lately was shown some of the most remarkable improvements since the Paris Exhibition of 1867, when, as several of our makers have several times informed the public, the American instruments were awarded the highest honors at the judges' disposal.

The Wrest-Plank.—One of the improvements upon which great stress is laid is quite recent, having been in use for less than a year, and consists in including in the iron frame the "wrest-plank," the piece of timber into which the tuning-pins are inserted. This was attempted years ago, but it was thought that the sound of the piano was injured; the pins now run through the iron wrest-plank and into the wooden wrest-plank beneath, the result being that the pins are less liable to move owing to the occasional warping of the wood. The iron frame, as every one knows, was only resorted to when the immense tension of the strings in large pianos made wooden bracing out of the question. The pulling strain in a grand piano amounts to about twelve tons; such a strain eventually warps any kind of wooden framework. The Americans were the first to introduce the iron frame cast in one piece.

Sonority and Tone.—Since the adoption of the iron frame made absolutely necessary by the sudden variations of temperature in this climate, the constant aim of all American manufacturers has been to obtain sonority and good tone. Several of the most important improvements of the last ten years have related to increased sonority. One of the new methods employed is to make the outward case of the piano one continuous piece of bent wood instead of in several pieces, thus giving a more continuous tone. Another important invention, and the cause of several lawsuits, is to allow the cast-iron frame to rest upon a number of wooden dowel pins let into the framework of the piano and projecting only a hair's breadth, just sufficient to lift the iron frame and its strings off the woodwork bracing under the frame. The use of these dowel-pins to keep the frame entirely separate is apparently a small matter and costs only a trifle, but one of the most famous patent suits was concerning this invention; and a piano of a rival maker, who denied having used it, was chopped to pieces in court by the owner of the patents in order to show that it had been used. The piano was ruined, but the suit was won.

Overstringing.—Another vast improvement of the last twenty years, now used by all makers, is the overstringing of the heaviest strings. In large pianos extending seven octaves or more the sounding-board will have to be larger than will be practicable to allow the strings to be stretched side by side as in the old pianos, with

their few octaves; the old-fashioned pianos having only six octaves or less. As the effective part of the sounding-board is toward its heart or center, a dozen of the lower strings are placed half an inch higher than the other strings and allowed to cross the sounding-board above them, thus bringing the whole mass of strings over the effective parts of the sounding-board.

Singing Tone.—The result of a score of improvements in increasing the sonority of the iron-frame pianos, many of which improvements cannot be described without drawings and long technical explanations, is that whereas a string, when struck upon a good piano, now vibrates audibly for nearly half a minute, a quarter of a minute was the former extent of the vibration. One of the best tests of a good piano, so far as sonority is concerned, is to strike a note firmly and count the seconds during which the vibrations are audible; holding the key down all the time, of course.

The improvements in the action of pianos since the Paris Exhibition of 1867 have been the introduction of metallic rods filled with wood, for supporting the action in place of the wooden bars in former use. The metal rods make the action of the whole piano uniform, one key requiring just as much force to depress it as another, and the weather not affecting the ease with which the action works.

OLE BULL.

In the interesting memoir of Ole Bull by his wife, lately published, reference is made to his attempts to introduce into piano-building the same principles on which a good violin is constructed, and by which it improves with age. An old well-made violin, well played, learns more and more to vibrate uniformly. Ole Bull himself had a newer sounding-post in an old violin, and could not get the tone he wanted till the accidental smashing of an old double bass afforded him wood that had learned to vibrate, out of which to make a new old sounding-post. Why, he said, should a violin wear better, and a piano wear out? If he could only make the frame of a piano that should behave as his violin, and mellow—not thin—with age! But although the great Norwegian lavished his own time and money, and although John Ericsson, hearing of his laudable efforts, joined him, the problem was not wrought out in Ole Bull's lifetime, nor has it been since his death. Let us hope that if not we, then our children, or our children's children, shall be able to buy pianos whose sonority and depth of tone shall increase with age, and that "thing of beauty," a new Steinway—shall we say?—grand, shall indeed be a joy forever, so to speak.

HOME PETS.

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THE CANARY.

Wild and Cultivated.—These birds came originally from the Canary Islands; but the wild birds are not so beautiful as those in our cages and aviaries. Cultivation has improved the appearance, as well as the voice, greatly. All, or nearly all, of the wild canaries are gray, with a greenish tinge; the rich golden plumage which is so familiar to us, is seldom seen among them.

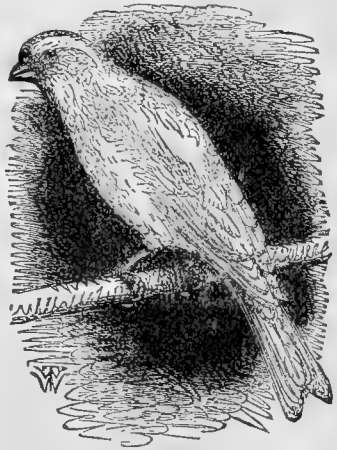
Cages.—A canary should be kept in a metal cage, as it can be most easily cleaned, and can be made very light and pretty. The shape should be circular, and there should be at least a foot in height of interior space, and eight inches in length and breadth; there should be two or three perches, one very near the bottom, so that the bird can stand on it and peck from the seed and water vessels; another about half-way up, and one yet higher, unless there is a ring suspended on the top of the dome: these perches should cross each other. The breeding-cage, of course, must be more roomy, and of a different shape; but about this we can give no directions that would be of much service: if any of our readers mean to go into canary-breeding, a book on that particular subject had better be procured.

Precautions as to Hanging.—Take care that your canary-cage is not hung in a draught, or in a place where there is a foul smell of any kind; the lungs of the bird are delicate, and many a pet has languished and died without any perceptible cause, through breathing keen or unwholesome air. If in a room where gas is burned, the cage should always be lowered or taken away before it is lit, as the air above soon gets heated and unfit for breathing.

Vessels should be of Glass.—Seed and water vessels are best of glass, as they can be most easily kept clean and bright, as everything about a bird should be—clear as the crystal water and bright as the sunshine in which it delights. Yet there should be provision made for shelter, too; it cannot live always in a glare: naturally much of its life is passed in the shadow of green leaves, so let it have some green about it when in confine-

ment, leafy boughs that quiver and wave as the breeze kisses them, and fresh flowers that give out a pleasant perfume, or, if these are not available, draw a covering of emerald-tinted gauze, or some other thin stuff, partly over the cage when the sun is hot and bright.

Canaries, like all shut-up birds, are subject to a variety of diseases, which probably do not affect them in a wild state where they have plenty of air and exercise and the food which exactly suits them. We cannot enumerate all the ailments to which they are subject, but may just lay down two or three simple rules by which they may be kept in health.



THE CANARY.

Food.—First, as to suitable food, without which no bird or other creature will keep well. Rape and canary seed mixed in about equal proportions, with now and then a little linseed added, is best under ordinary circumstances, and green meat, such as watercresses or groundsel, of which canaries are especially fond; but this should not be allowed to remain in the cage over twenty-four hours. A little piece of sugar may be placed between the bars for the bird to peck now and then, but not often; nor should sweet cake, or rich food of any kind, be frequently given, as it is likely to produce surfeit. Pre-

pared food is easily to be had almost everywhere, and saves a deal of trouble. When breeding or moulting, hard-boiled eggs, chopped small and mixed with crumbs of stale bread or bun, with a little maw-seed; fresh clear water, changed every day, and a scrupulous attention to cleanliness. Attend to these simple rules, and your bird will be brisk and blithe, and well repay your care and attention by his sweet song and pretty engaging actions. If he can be let out to fly about the room occasionally, so much the better, and better still if he can have the range of an aviary.

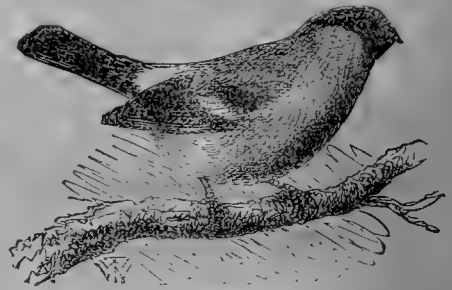
Cutting Claws.—The claws of canaries, like those of other cage-birds, often get uncomfortably long; wild birds keep them short by scratching. When they require cutting, it should be done with a sharp pair of scissors; the bird to be operated on should be taken gently, yet firmly, and the toes turned up to the light, so that you can see how far it is safe to cut. When moulting-time is coming on, which is generally in the autumn, the bird loses its liveliness, and becomes silent; the cage will be strewn with feathers, and then is the time for extra care and nourishing food, such as chopped egg and maw-seed, with a little saffron in the water.

Red Mites.—We need but mention one very troublesome visitation, which one is indeed often a legion: if you see your pet canary moping about, moving restlessly from side to side of his perch—which should always be of a good size and round, so that the bird's claws can grasp it tightly—and seeming generally very uncomfortable, take him out of the cage, blow open the feathers beneath his wings and other under-parts, and you will, no doubt, see a number of little crimson dots, which are the insect pests called red mites. It is extremely difficult to get rid of these when once they take possession of a cage: the best plan to rid the bird of them is to put about ten grains of white precipitate powder into a wine-glassful of warm water, and with this solution wash the bird carefully wherever the mites are likely to be, taking care that none of the solution gets into your pet's eyes, nose or mouth; then wash him well with clean warm water, wrap him in flannel and put him in a warm place to dry. The cage should also be well washed in precipitate-water of about three times the above strength; if a wooden cage, with many holes and crevices, it had better be destroyed. These mites, which are a small kind of bug, often infest breeding-cages, and so torment the sitting birds that they leave their nests, and so render the hopes of the breeder futile. Sometimes, if a clean white cloth is placed over the cage of the canary so infested, the vermin will gather on the cloth and may thus be removed.

THE BULLFINCH

is another highly valued cage-bird, very handsome and gentle and teachable. He may be taught all sorts of tricks, such as drawing up a bucket from an imaginary well, etc. But we should not care to give him much of this sort of work to do: it is amusing and pretty to see, but the bird never really likes it, and we should not punish any creature for our pleasure.

How to Teach Them to Sing.—This bird has a rich and flexible voice, and may be taught to pipe any simple tune when young. Piping bullfinches fetch high prices: The Germans take great pains in teaching them, and have regular schools for their instruction, in which they are divided into classes, with a teacher to each. The birds are kept very much in the dark at first, so that their attention may not be diverted from the tune which they have to learn; this is sometimes whistled to them, at others played on a hand-organ or flute. The teaching has to be continued for about three quarters of a year,



THE BULLFINCH.

and as with children so it is with these feathered pupils; some are much quicker at learning than others. There are bullfinches that whistle or pipe three distinct airs, and these will fetch a large price; but generally they have but a single simple air.

Varieties.—There are curious varieties of this species, such as white, black and speckled, and these are highly valued on account of their rarity; but they are nothing like so beautiful as Bully in his natural plumage, with his black velvet cap, and coat of soft gray, deepening at places into blue, with a fine vermilion tinge, like the reflection of fire, over the breast and under-parts.

Food.—In confinement he should have rape, poppy and millet seeds, with now and then a little sprouting wheat, barley or oats; lettuce, watercresses, ripe fruit, and, as a great treat, cracked nuts—which he can eat, having a strong bill. Hemp-seed should not be given, or he will become too fat, and liable to apoplexy. Moreover, it is apt to dull the rich colors of the plumage.

Young bullfinches should be reared upon rape, bread and milk, with a little soaked hemp-seed bruised in a mortar, or buckwheat-meal.

THE CARRIER PIGEON.

Its History. This is the most useful, celebrated and in every way remarkable of the domesticated pigeons: it has a history extending back to a period anterior to the foundation of Rome. The names of the victors in the Olympian games were made known through the Roman provinces by means of this bird. Keen of sight and strong of wing, this bird when released always flies straight to its home, no matter how great may be the intervening distance; so it is taken to the scene of the contest, and directly the result is known it is released with a message, which is eagerly received by those who are waiting the arrival of the messenger. The dispatch so transmitted is written on a small piece of thin paper, which is rolled up and fastened to one of the tail-feathers by means of a piece of fine wire, which is wound round the shaft of the feathers to



THE CARRIER PIGEON.

make it secure: in this way it does not impede the flight of the bird. Sometimes it is fastened to the leg with worsted. The winged messenger flies with great swiftness; often from forty to sixty miles an hour.

Its Points.—The twelve points which, according to the recognized rules, a thoroughbred carrier should possess, are these: The head, straight, long and flat. The beak, straight, long and thick. The wattle, broad at the base, short from the head to the bill, and leaning forward. The eye, large, round and uniform. A bird with these qualifications, and being of one color, dark blue, will be likely to take a prize at a pigeon-show. "Cinnamon birds," as those of a dun-color are called, are not so much valued, although they may possess all the above-named good points, and have as much sagacity and power of wing as the others. A long, lithe body, and a firm strong wing, a proud bold look, and great activity, are the characteristics of the carrier

in the prime of his life; as he grows old, he becomes stout and inactive, his wattle increases in bulk, his eye loses its brightness, and his feathers their beautiful gloss; he is then only fit for breeding purposes.

The Telegraph Supersedes Them.—Since the introduction of the electric telegraph, pigeon expresses have not been so much used as they formerly were; consequently the breeding and training of the birds is comparatively little practiced. Still, the carriers hold a high place among the fancy kinds. They are not prolific breeders, nor attentive and affectionate parents: frequently they destroy their eggs and neglect their "squabs," as young pigeons before they are fledged are called—after that they are "squeakers."

Avoid Breeding in and in.—With carriers, as with other pigeons, breeding "in and in," as it is called—that is, getting a stock from the offspring of a single pair of birds—is bad: they will generally be small and weakly. Any breeder will exchange eggs with another whose stock is good. The best and steadiest sitters are the common Dove-house, the Runt and the Dragon, to one or other of which is generally deputed the task of hatching and bringing up the young carriers.

THE DOVE

is the commonest of all, and with us, as with most persons, a great favorite. It is very close to the original type, if it be not the same species as that from which all our domestic pigeons come. It so closely resembles the wild pigeons of this and other countries as to leave little doubt of its being the same species; and, although the peculiarities of many of the fancy kinds are so very marked and distinctive, yet such astonishing changes and diversities are produced by cross-breeding and cultivation that we may well believe it possible for all these to have come from one common stock.

The Common Pigeon.—A very beautiful bird is the common pigeon, of a soft, silky slate-color, relieved with white, and barred and mottled with black, with green and purple reflections playing about the neck; a beautiful, a gentle and a very useful bird; and most prolific—a single pair will, sometimes produce eight or ten pairs in the year.

Their Houses.—The best kind of a pigeon-house is an old loft over a stable or outhouse, or a disused attic of a house may be made available for the purpose; it only requires compartments fitted up for the different pairs of pigeons, which, if they have not separate resting-places, will be constantly quarreling and fighting, breaking their eggs and killing their squabs and squeakers. The window on the roof should not open to the east, and should be made so as to form a plat-

form for the birds to alight on when open, and to admit light and air when closed. We cannot here enter into very minute particulars of treatment, but would enforce the necessity of frequent cleaning; and fresh sand or coarse gravel on the floor, with a little chalk or old mortar, and a sprinkling of salt, for the birds to go to when they please: lime in some shape is essential to the formation of their egg-shells, and they will pick the mortar from between the bricks all around if they have not a supply provided for them. Rats, mice and cats must be guarded against; the first are very destructive of both eggs and young, and the last of old birds as well. Near to the entrance of the pigeon-house should be a chimney or other conspicuous object, painted or washed with white, as a landmark for the birds when flying home.

A good and safe kind of pigeon-house is one made of wood, and fixed well up against the side of a building, with a separate entrance for each compartment, or it may be a round structure like a barrel, fixed on the top of a post or pole, and, by an arrangement of ropes and pulleys, made to draw up or down, or it may be made easy of access by a rope or other ladder. But whatever or wherever the house may be, it should always have an elevated position.

They are Prolific.—A pair of runts, or pigeons, if allowed to breed, will soon stock the house, and keep up a good supply of eggs and squeakers. If new birds are introduced, they should be young ones, as those fully grown, who have been used to another house, will be pretty sure to return to it. A barbarous practice prevails of plucking out the larger wing-feathers to prevent the flight of such birds; but this should never be done: the mutilated birds frequently become diseased and die, besides which, as soon as they recover their powers of flight, they will be the more likely to leave a place where they have been so cruelly treated.

Pigeon Food.—Gray peas, with an occasional change of wheat, oats or barley, and the small beans known as pigeons' beans, which should be at least a year old, are the best food. Rape and hemp seed are sometimes given as a stimulant; but the last is of too heating a nature, and should be given very sparingly, if at all. Both grain and seed should be clean and sound; if decayed, they will be full of mites, which are mischievous to the birds. A little green food is desirable: mustard and cress, lettuce or cabbage, if grown within reach, will be taken by pigeons if they are at large; if not, something of the kind must be put into their house or inclosure, taking care that the refuse is not left to decay.

Pigeons are said to be fond of strong odors; and to sprinkle the floor of their house with

lavender, or asafetida, or anything that smells powerfully, is thought to be a good means of inducing new-comers to remain. To fatten squabs, give maize steeped in water, and keep them under an inverted hamper, or where they can have air without much light.

Doves may be fed and treated like pigeons generally.

RABBITS.

We have now got into a different division of the animal kingdom, and jumped from feathered to furred, from two- to four-footed pets, creatures that live wholly upon the earth, and, being destitute of the organs of flight, cannot escape, as birds often can, from man and other enemies. Many of them are very useful to us: they yield us food and clothing, and in other ways minister to our numerous wants, and for this reason alone, but more for the higher motive of humanity, they demand our tender care and consideration.

Hutches.—It is a common notion that anybody



THE RABBIT.

can make a rabbit-hutch out of anything, but this is a popular fallacy. True, an old tea-chest, or any kind of box, will do for the purpose, and rabbits will live and thrive in very inconvenient places; but they will do best in a comfortable habitation, into which neither the wet nor the cold wind can penetrate. Unless the stock is very large, a portable hutch is better than a fixed one, in shape like the common dog-kennel, with the shelving roof on both sides overlapping considerably, so that small gimlet-holes for ventilation can be made along the top, protected by the lap of the roof. It should be high enough for a division into an upper and lower story, the breeding-places being above. The floor should be of beech or some other hard wood, that will not absorb urine and soft matter, which make such places often smell so bad, and it should be frequently cleaned.

The lower floor should be raised by legs or some other contrivance several inches from the ground, and in this holes should be bored for

drainage. Each doe in the breeding-room above should have a separate compartment, which can be got at without interfering with the others. The whole should have a latticed front, but, if in an exposed situation; there should be a shutter also, which can be put up in bad weather.

Food.—Rabbits will eat almost anything that is green, or, indeed, any vegetable food, and thrive upon it: they are voracious eaters, and are particularly fond of sow-thistle, carrots with the tops, cabbage and lettuce leaves; they should also have oat and barley meal, corn and hay. In the wild state they are animals that feed in the twilight, so the morning and evening are the best times for their supply of food. It is a disputed point whether they require water, and with plenty of green food, perhaps they may do well without; but when the food is mostly dry, they should be supplied with this great requisite of animal existence. The habit some does have of eating their young has been ascribed to a sort of frenzy, produced by excessive thirst: one cause of this is undoubtedly having more than the doe can well suckle, and her powers of sustenance should not be too highly taxed. If there are more than eight young ones in a brood, some of them should be destroyed. A doe will not unfrequently bring up as many as twelve, and even fourteen, but this should not be permitted. While she is suckling she should be well fed on barley-meal and milk, with a little green food. The young may be taken from her when they are eight weeks old; they will then be able to feed themselves.

Let no reader fancy that he is going to make a fortune by rabbit-breeding: it may be pleasant, but, as a rule, it is not profitable—the animals eat too much, and skins and flesh fetch too little.

Yet it is well to have pets, and rabbits are about as easily managed as any.

TORTOISES.

If you buy a tortoise, or have one given to you, leave it alone as much as possible; let it have the run of the garden, or any place where there is plenty of juicy vegetation, and it will take care of itself. You need not be afraid of treading on it, for its beautifully constructed shell so strongly protects this most curious animal, that a wagon might almost pass over without crushing it. This is Mr. Slow-and-sure, who, you know, beat the hare in a race because he kept steadily on at an even pace, while she ran a little way and then slept, thinking she could easily make up for lost time. Although no great traveler, the tortoise often disappears for a while as though he had gone on a long journey, but he is all the time close at hand down in the earth, or under a heap of dead leaves or rubbish, lying in a torpid state, as do lizards, snakes and other cold-blooded animals, as they are called, for this creature belongs to the class of reptiles, which are wonderfully tenacious of life: some of them have lived and moved with their brains taken out, and even with their heads off; as to the loss of a limb that seems a mere trifle to them. If you have strawberry-beds, keep the tortoise away from them, or you will never have a strawberry for your own table. Although the shell is so thick and strong, yet it is very sensitive: the slightest tap on it, or even the pattering of a few drops of rain, will make the creature draw in its snake-like head and scaly legs. It will go an immense time without food, and live to an extraordinary age, some say hundreds of years.

THE AQUARIUM.

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A Modern Invention.—This beautiful arrangement, in which the habits of fish and other denizens of the water can be so readily observed and studied, is a comparatively modern invention, and affords another instance of the dependence of the arts and sciences, one upon another. Without the discoveries made of late years into the varying and mutually helpful offices of plants and animals, a modern aquarium would not be a possibility. Mrs. Power, a lady of French descent, in 1832 began the study of algæ and fishes from the coast of Sicily, by transferring them to glass receptacles, often changing the water.

The Old Theory.—The received theory then was, that, as animals living upon the surface of the earth in breathing combine the oxygen of the air with the carbon their bodies furnish, and thus contaminate the atmosphere; so animals living in the water consume the oxygen of the air it contains, and the result would prove fatal to life, if not removed. But more than two centuries ago, marine animals were, for purposes of observation and study, removed from the sea and kept in confinement, and there is extant a drawing, of the date of 1742, which represents the form of an aquarium containing zoophytes. Esper, a dis-

tinguished entomologist, a hundred years ago kept aquatic insects in water for observation. Sir John Graham Dalyell had in his house in Edinburgh, the early part of this century, an aquarium of a very humble kind, but that answered the purpose. The animals he kept lived a great while; one sea-anemone taken from its home in 1828 being alive and well in 1873.

The New Discoveries.—But when the relations between animal and vegetable life came to be better understood, through the researches of science, and it was recognized that under the action of light plants consume the carbonic-acid gas given forth by animals, and thus keep up a constant restoration to the air or water of the oxygen necessary for the maintenance of animal life, the present aquarium became possible. It must contain both plants and animals, and in something like a proper proportion: Zoophytes, annelides, mollusca, crustacea and fishes may thus, with care, be kept in health, and observed.

Aerating the Water.—The water must be frequently aerated, which can be accomplished by taking up portions of it and pouring them in again from a small height. The fresh-water aquarium is frequently provided with a fountain, which produces a continual change of water; but even where this is the case, the presence both of plants and animals is advantageous to the health of both. When sea-water cannot easily be procured for the marine aquarium, a substitute may be made by mixing with rather less than four quarts of spring-water three and a half ounces of common table-salt, a quarter ounce of Epsom salts, two hundred grains troy of chloride of magnesium and forty grains troy of chloride of potassium. With care, the water may be kept good for a long time. No dead animal or decaying plant must be permitted to remain in it.

Artificial Sea-Water.—Salt water, artificially prepared, is not fit for the reception of animals at once; but a few plants must first be placed in it, for which purpose some of the green algæ, species of ulva and conferva, are most suitable. The presence of a number of molluscous animals, such as the common periwinkle, is necessary for the consumption of the continually growing vegetable matter, and of the multitudinous spores (seeds), particularly of confervæ, which would otherwise soon fill the water, rendering it greenish or brownish, and opaque.

Fresh Water.—In a fresh-water aquarium, molluscous animals of similar habits, such as species of *lymnæa* or *planorbis*, are equally indispensable. For large aquaria, tanks of plate-glass are commonly used; smaller ones are made of bottle-glass or of crystal.

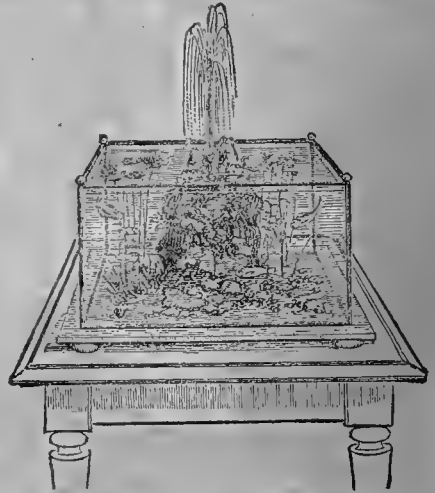
The Best Inmates.—Of course, the plants and animals with which the aquarium is stocked are vari-

ous, according to taste and opportunities, or the desire to make particular kinds the subjects of careful and continued observation. Caution is



SIMPLE FORM OF AN AQUARIUM.

needed as to the inmates. In fresh water a young pickerel, less than two inches long, can dispose of a couple of dozen minnows in a week. The stickleback takes the lead for general interest, and desirable inmates are Prussian carp, minnows, perch, gudgeon, tench and gold fish, with snails and mussels. For marine aquaria, min-



AQUARIUM, WITH FOUNTAIN FOR AERATING.

nnows, sticklebacks and shrimps, small lobsters, hermit crabs, eels and starfishes are valuable.

An Open Door.—But any boy or girl of average powers will soon learn to make an intelligent selection from the animal or vegetable life accessible at home. A good magnifying-lens adds greatly to the interest; and here, as everywhere else in Nature, the deepest and closest study is the best rewarded. The writer of Esdras said: The more thou searchest, the more thou shalt wonder; and the saying is growing ever truer. The life going on in a well-managed aquarium is as wide open a door as any, into the infinite life of the universe.

DOGS.

Under human care, the domestic dog has become, according to Baron Cuvier, "the completest, the most singular and the most useful conquest ever made by man." His origin is not separable from that of the jackal and the wolf. In the earliest literature we find him. The Egyptian deity Anubis is represented on monuments as having the head of a jackal, with pointed ears and snout, which the Greeks frequently changed to those of a dog. This may help to account for the contempt with which dogs were regarded among the Jews, from the beginning of their history as it has come down to us, and perhaps even among neighboring peoples. "The Philistine said to David, Am I a dog?" By Homer, however, it has been very differently mentioned; and "there is not a modern story of the kind which can surpass the affecting simplicity with which poor Argus's dying recognition of his long-lost master Ulysses is related by one who wrote, probably not less than two thousand seven hundred years ago,"—perhaps even earlier:

"He knew his lord; he knew, and strove to meet,
In vain he strove to crawl, and kiss his feet;
Yet (all he could) his tail, his tears, his eyes,
Salute his master, and confess his joys,
Soft pity touch'd the mighty master's soul;
Adown his cheek a tear unbidden stole.

Takes a last look, and having seen him, dies;
So closed forever faithful Argus' eyes!"

Pope's translation.

The sculptures of Nineveh and the hieroglyphics of Egypt attest the very early domestication of the dog, and the existence of races similar to some of those now extant; and the high value attached to it by many nations is further witnessed by the place assigned to it or its image, as emblematic of the attributes which they ascribed to their gods. In the Mahabhārata, the king Yudisthira leaves his throne with his four brothers and Drapaudi, "and the seventh was a dog that followed them," on a forlorn journey to Indra's heaven, there to find the rest seemingly denied them on earth. One after another dropped off on the road till Yudisthira and the dog alone appeared at the gate, and Indra welcomed the king, and told him he should find in heaven his brothers and Drapaudi. Yudisthira:

"O Indra, and what of this dog? it has faithfully followed me through:

Let it go with me into heaven, for my soul is full of compassion."

Indra refuses; and the king scornfully turns his back upon a heaven, to be entered only by the crime of forsaking a dependent.

And in modern times: how large a place does this faithful animal occupy in history and in literature. The author of "Rab and his Friends" is only one of a long catalogue of writers who have recorded the virtues and the vices, the cunning, the affections and the prowess of dogs. They have their failures and their virtues, to an almost human degree. An Adirondack hound *must* attack a hedge-pig rolled into a ball to await the onset, although the quills are sure to pin the hound's mouth together, and make him useless for weeks and months; and even though he has only just emerged from a previous similar experience. And he holds out his paw or his jaw to the knife that must do the necessary surgery, and, untied, and without chloroform, endures the agony.

The hunting and sporting dogs so much used in England and Europe generally, and the blood-



SHEPHERD'S DOG.

hounds bred to track human beings, have in this country an interest merely as curiosities. Some few attempts have been spasmodically made in the United States to revive fox-hunting, or some other form of "survival" with which older countries are still cursed, but which are surely doomed to a not very distant death. But the shepherd's dog is one of the most interesting and attractive of his kind. In the highlands of Scotland he is invaluable. The Ettrick Shepherd says: "It would require more hands to manage a stock of sheep, gather them from the hills, force them into houses and folds, and drive them to markets, than the profits of the whole stock would be capable of maintaining." "When riding" in South America, says Darwin, "it is a common thing to meet a large flock of sheep, guarded by one or two dogs, at the distance of some miles from any house or man." And he learned the method by which this friendship between dog

and sheep had been established. The puppy is removed from its mother, kept in the sheep-pen, and suckled by a ewe. Generally it is castrated, and thus has little or no community of feeling with its kind. Brought up among the sheep, it shows no desire to leave them, but assumes the position of leader. "It is amusing," Darwin goes on, "to observe, when approaching a flock, how the dog immediately advances barking, and the sheep all close in his rear as if around the oldest ram." It comes home daily for food, and immediately returns to its charge, and this it is often taught to bring home in the evening.

The Newfoundland dog is well known as a most faithful guardian of property, and as remarkably fond of the water, from which it has saved multitudes of lives. In Newfoundland and Labrador, these dogs are used as beasts of burden, and trained to draw sledges. The Great St. Bernard dog has been useful in rescuing lives imperiled in snow and storm, as the Newfoundland has in saving from the water. He is a powerful animal, kept by the monks of the Hospice of St. Bernard in their convent, on a most dangerous pass between Switzerland and



KING CHARLES SPANIEL.

Italy. When the need seems present, these dogs are sent out in pairs, one bearing a flask of spirits and the other a cloak. When they cannot rescue without help, they bark for it; often detecting a traveler even several feet beneath the snow. One dog lost on such an errand bore a medal stating that it had been the means of saving twenty-two lives. But the improvement of roads, and better means of locomotion generally, are lessening the importance of their services.

The mastiff, the bull-dog, the terrier and the spaniel, including the King Charles variety, are all well-known varieties, each useful in its place.

No satisfactory classification of the different kinds of dog has ever been made. What some naturalists regard as types of species others pronounce to be mere mongrel races. Nor can any principle of arrangement be found in form, roughness or smoothness of fur, or other such character, which will not associate kinds that are in other respects widely dissimilar, and separate some that are nearly allied. Richardson arranges

them in three great groups, indicated by the least variable part of their osteological structure, cranial development." 1. Including the Irish wolf-dog, highland deerhound, grayhounds, and tigerhounds, characterized by *convergent* parietal bones, an elongated muzzle, and high and slender form. 2. Including the great Dane, the French mastiff, the pariah of India, the bloodhound, stag-hound, foxhound, harrier, beagle, pointers, terriers, turnspit, Newfoundland dog, Labrador dog, Pomeranian dog, Esquimaux dog, Siberian dog, shepherd's dog, etc., characterised, by *parallel* parietal bones, and generally by much acuteness of smell. 3. Including mastiffs, the great St. Bernard dog, bull-dog, pug-dog, etc., characterized by sensibly *divergent* parietal bones, bulk of body, robust structure, and combative propensities.

It ought never to be overlooked, in dealing with dogs, that there may be danger of hydrophobia, that most dreadful disease, with whose origin, nature and cure, science has not yet successfully grappled. Even though an almost infinitesimal proportion of dogs ever have it, and even although of actual bites from the actually mad, it is not certain that any bad effects will follow. Dr. John Hunter stating that he knew an instance in which, of twenty-one persons bitten by a mad dog, only one was affected; still, the almost certain death with circumstances most revolting, of those whom the disease actually attacks, ought to dissuade from any carelessness. Mad dogs do not necessarily have any dislike to water, and they are not exclusively or especially liable to the disease in hot weather. The dog loses his appetite, becomes sullen, fidgety, has a vacant gaze, licks or gnaws the injured part, laps any liquid that comes in his way, eats wood, hair, straw and other indigestible substances, becomes quarrelsome, bent on mischief, bites at anything that comes in his way, and his bark is more like a howl; his lower jaw often becomes pendulous, and general paralysis sometimes precedes death; and, as a rule, on the fifth or sixth day he dies. Preventive measures, when the disease is present, or even suspected, should be immediately taken. All dogs known to have been bitten, or been in the company of a rabid animal, should be immediately destroyed, and all other neighboring dogs muzzled. And any dog showing symptoms such as detailed above, should be promptly killed, or at any rate muzzled and closely confined, till the symptoms disappear and normal health is re-established. Human life is so much more precious than merely animal, that not the faintest risk should be knowingly run. Do not hesitate to sacrifice a dog or dogs even if really innocent of any taint of the disease, rather than jeopard the safety of human beings.

BEES.

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BEES, THEIR PLACE IN HISTORY.

The bee, says the *Encyclopædia Britannica*, from its singular instincts, its active industry, and the useful products resulting from its labors, has, from the remotest times, attracted general attention and interest. No nation upon earth has had so many historians as this remarkable class of insects. The patience and sagacity of the naturalist have had an ample field for exercise in the study of the structure, physiology and domestic economy of bees; their preservation and increase have been objects of assiduous care to the agriculturist; and their reputed perfection of policy and government have long been the theme of admiration, and have supplied copious materials for argument and allusion to the poet and the moralist in every age. It is a subject that has been celebrated by the muse of Virgil, and illustrated by the philosophic genius of Aristotle. Cicero and Pliny record that Aristomachus devoted sixty years to the study of these insects; and Philiscus is said to have retired into a remote wood, that he might pursue his observations on them without interruption. A very great number of authors have written express treatises on bees; periodical works have been published relating exclusively to their management and economy; and learned societies have been established for the sole purpose of conducting researches on this subject.

MULTUM IN PARVO.

How could this be otherwise? Within this little body are contained apparatus for converting the various sweets which it collects into one kind of nourishment for itself, another for the common brood, a third for the royal brood, glue for its carpentry, wax for its cells, poison for its enemies, honey for its master, with a proboscis as long as the body itself, microscopic in several

parts, telescopic in its mode of action, with a sting so exceedingly sharp that were it magnified by the same glass which makes a needle's point seem a quarter of an inch, it would yet itself be invisible, and this, too, a hollow tube. And all these varied operations and contrivances are included within half an inch in length and two grains weight of matter.

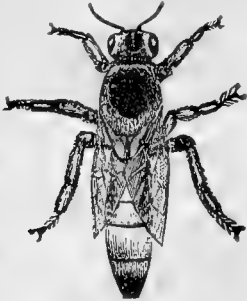
A WONDERFUL COMMUNITY.

Prof. Jaeger says: It is impossible for any reflecting person to look at a bee-hive in full operation without being astonished at the activity and surprising industry of its inhabitants. We see crowds constantly arriving from the woods, meadows, fields and gardens, laden with provisions and materials for future use, while others are continually flying off on similar collecting expeditions. Some are carrying out the dead, others are removing dirt and offal, while others are giving battle to any strangers that may dare intrude. Suddenly a cloud appears, and the bees hurry home, thronging at the entrance to the hive by thousands, until all are gradually received within their inclosure. In the interior of the hive we see with what skill they work their combs and deposit the honey; and when their labor is over for the day, they rest in chains suspended from the ceiling of their habitation, one bee clinging with its forefeet to the hindfeet of the one above it, until it seems impossible that the upper one can be strong enough to support the weight of so many hundreds.

THE THREE CLASSES.

The leading feature in the natural history of bees, and one which distinguishes them from almost all other insects, is their singular distribution into three different classes, constituting to all appearances so many different modifications of sex. In the cuts the size is enlarged beyond that

of nature, but the proportions are preserved. The drone, the male of the species, has a thicker body, a rounder head, a more flattened shape, and more obtusely terminated abdomen. It has no sting, and may be detected by the humming noise that accompanies its flight. The queen-bee, the female, is the largest of the three, has a longer abdomen, with two ovaria of considera-



THE QUEEN.

ble size, and a curved sting. The workers compose the third class, and are distinguished by the smallness of their size, their lengthened proboscis, the peculiar structure of their legs and thighs, adapted to the collection of certain materials obtained from vegetables, and by the apparent absence of any generative organs. It is their function to perform all the laborious



THE DRONE.



THE WORKER.

offices for the community, to construct the interior of their habitation, to explore the country in search of nourishment and other materials, to collect and bring them to the hive and apply them to different purposes, to attend upon the queen and supply all her wants, to defend the hive from the attacks of depredators, and to carry on hostilities against the various enemies of the tribe.

A UNIQUE DIVISION.

Here, then, is a wide departure from the methods by which other animals live, and are perpetuated. The keeping up of the race is confided by Nature to members of the community other than those who do its actual work. This arrangement is, we believe, a unique one. In-

stead of the power of perpetuation being committed to the rank and file, and that rank and file divided into male and female, in approximately equal proportions, the sexual functions being performed by individuals who have to take care of themselves otherwise, here we find a most curious "division of labor." Whereas, in other departments of animated nature, the male holds the post of honor, and rules by virtue of his virility, here he is merely tolerated because his services are indispensable, and when the use for them has passed, he is ingloriously hustled out of an unnecessary existence. The female is the mother of all in the same hive, and will endure no sister. Her labors are constant, and her life long. The overwhelming majority are sexless—mere workers, to whom all paternity and maternity are as foreign as a symphony of Beethoven's to a man born deaf.

The Honey-Bee and its Varieties.—The best known varieties of the honey-bee are the German or black bee and the Ligurian or Italian bee. The so-called black bees are really a grayish black. The German bees are about of one color. The Italians are easily distinguished by the bright yellow rings—three, when the breed is pure—at the base of the abdomen. The Egyptian bees have a broad band of yellow, and are smaller and more slender than Italian bees. The Cyprian bee is yellow, and is doubtless a variety of the Italian. Many other "fancy" varieties are yearly advertised, but it is best to stick to the well-tried German and Italian bees.

THE DRONES.

Their Shape and Number.—The males are called drones from the peculiar noise they make in their flight, are much larger than the workers, and thicker in proportion. The antennæ have an additional joint, and their eyes are remarkably large, meeting upon the crown. They produce neither wax nor honey, and live by the labor of others, of which they are mere idle spectators. The intercourse with the queen, for which alone they seem to exist, takes place in the open air, and on the wing; the queen carrying back with her to the hive part of the mutilated body of the drone she has met, and he falling to the ground to perish. Although this occurs to a queen once for all her lifetime, still as it must be in the open air, Huber thinks the otherwise apparently unnecessary number of drones is needed, that she may be sure to encounter one when she flies abroad for the purpose. In the spring they are said to be a thirtieth to a fortieth of the whole. A fecundated queen seems to lay drone or worker eggs at will: an unfecundated queen lays eggs indiscriminately in drone and worker cells, but her eggs produce drones only.

Massacre of the Drones.—After swarming time, when the queens are impregnated, and no new swarms are about to take place, the workers, who until then have allowed the drones to live unmolested in the hive, are on a sudden seized with deadly fury towards them. This usually happens in June, July or August. They chase their unhappy victims in every quarter, till they drive them to the bottom of the hive, where they indiscriminately massacre them, and throw them out on the ground. Not only do they kill every living drone, but they destroy all male eggs and larvæ, and tear open the cocoons of their pupæ. This sacrifice of the drones is not an indiscriminating instinct; for if a hive be deprived of its queen, the massacre does not take place in that particular hive, and the drones are allowed to survive the winter.

Their Normal Age Unknown.—Drones seldom die a natural death. From the egg to the full-grown male, about twenty-five days are needed. There is no evidence of the duration of the lives of individuals, but in usual course they are hatched about May and slaughtered in June, July or August.

THE QUEEN-BEE.

Her Appearance.—She is considerably longer than either the workers or the males; distinguished by the yellow tint of the under-part of the body, and by the shortness of her wings, which, instead of reaching to the extremity of the abdomen, leave some of its rings uncovered. There is commonly only one perfect queen existing at one time within one hive, and she usually appears to be treated by all the other bees with every mark of affection and deference.

Her Metamorphosis.—When from the egg or young larva it is the intention of the bees to raise a queen, their attention is most incessantly bestowed upon it. Its cell is enlarged, and it is supplied with a peculiar and more stimulating food than that of ordinary bees, not mawkish, but acid; and in quantities larger than can be consumed, so that some always remains over after the transformation. The growth and development of the larva are thus accelerated, and in five days it is prepared to spin its web, when the workers wall it up. After two days and a half, the larva becomes a pupa. In this state it remains four or five days, and on the sixteenth day after the laying of the egg, the perfect insect is produced, and is liberated by the workers.

Laying her Eggs.—The queen deposits eggs during ten or eleven months of the year in temperate climates. If the impregnation of a queen be delayed beyond the twenty-first day of her life, she becomes incapable of impregnation, and can

produce only drone-eggs. The abdomen of such a queen is much more slender than that of a fertile one. Young queens ordinarily commence ovipositing (or egg-laying) thirty-six hours after impregnation. How the queen determines the sex of her eggs is not known, but eggs that will produce workers or queens will always be found in worker-cells, and those that will produce drones in drone-cells. A queen of a new swarm will rarely produce drones the first year, instinct seemingly teaching her that they will not be required. In the early spring, if a piece of empty drone-comb be put into the center of the brood-nest, the queen will usually fill it with drone-eggs.

Number of Eggs Laid.—It is the queen's business to keep the colony populous, and certainly she attends to her business. She is capable of laying two to three thousand eggs a day, and has been known to lay six eggs in one minute. Berlepach tells of a queen that laid 3021 eggs in twenty-four hours by actual count, and 57,000 eggs in twenty days: that she continued prolific for five years, and must have laid during that time 1,300,000 eggs. Other careful observers also say that a queen may lay more than 1,000,000 eggs. Her spermatheca is capable, according to Lenckart, of containing 25,000,000 spermatozoa. If it can be compressed at will, as is probable, there may be here a hint of the way in which she produces the two different classes of eggs.

Loss of the Queen.—This event has a most marked influence on the workers, although it is nearly an hour before her absence seems to be discovered. Inquietude begins in one part of the hive, the workers become restless, abandon the young they were feeding, run to and fro, and communicate the alarming intelligence to their companions. The whole community is soon in a ferment, the bees rush precipitately from the hive, and seek in every direction for the lost queen. After a day or two tranquillity is re-established, they return to their labors, select an egg or a larva, and rear a new queen as already described.

Rivalship of the Queens.—A queen-bee, though perfectly formed, is not always at liberty to come out of her cell, which becomes a prison if the queen-mother be still in the hive waiting to lead out another swarm. The workers even strengthen the covering of the queen-cell, perforating it with a small hole through which the captive can thrust out her tongue to be fed. The royal prisoner keeps up a plaintive cry, called by bee-keepers "piping," and this is answered by the mother-queen. The modulations of this piping are said to vary. The motive of this proceeding on the part of the workers is to be found in the implacable hatred which the old queen bears against all of her own sex, and which impels her

to destroy without mercy all the young queens she can reach. So when there is a prospect of a swarm, soon issuing, they establish themselves as a guard around the queen-cells, and, forgetting their usual allegiance, beat off the old queen as often as she tries to approach them. But if the swarming season is over, the bees do not hinder the old queen, who immediately transfixes with her sting one after another of the royal brood. According to Huber, royal larvæ construct only imperfect cocoons, open behind, leaving exposed the abdomen below the first ring; as if Nature intended to give the old queen a chance at them with her fatal sting.

Queen Combats.—The same writer has made the singular observation that two queens, however inveterate their mutual hostility, never actually destroy each other. When in a contest they come into such a relative position that each can sting the other mortally, they suddenly separate, and part as if panic-stricken. Without this instinct, a hive might be altogether deprived of a queen.

Alien Queens.—Bees recognize the person of their own queen. If a stranger enter the hive, they seize and surround her till a ball of bees is formed one or two inches in diameter, and there keep her till she dies, as they seldom sting a queen. But a hive that has lost its queen can by certain precautions be induced to accept a substitute. A usual way is to imprison the stranger queen in a small wire-gauze cage and suspend her between two central combs. Soon the bees become accustomed to the odor and appearance of the new sovereign, and after a day or two readily accept her. But if a supernumerary queen be introduced into the hive, she is seized and brought to the reigning queen, a ring is formed, and the bees fight it out till one or the other perishes. Some observers hold that the vanquished queen is killed by the bees, others that the victor kills her.

Length of Life.—The life of a queen-bee will sometimes extend to four or five years; but her fertility generally decreases after her second breeding season. When absent from the hive on a matrimonial excursion, she often falls a prey to a bird. And sometimes she makes a mistake, and enters another hive where she does not belong, and then she or the original queen is destroyed. But if no accident happens to her, her life will probably last as above stated.

THE WORKERS.

Their Shape and Appearance.—They have a body about half an inch in length, and about one sixth of an inch in greatest breadth, at the upper part of the abdomen. The antennæ are twelve-jointed, and terminate in a knob. The abdomen

consists of six joints or rings, and under the scaly coverings of the four middle ones are situated the *wax-pockets*, or organs for the secretion of wax. The extremity of the abdomen is provided with a sting, which is straight. The basal joint of the hind tarsi is dilated to form a pollen-basket, and the legs are well provided with hairs for collecting the pollen and brushing it into this receptacle.

The Egg, the Larva and the Pupa.—The eggs of bees are of a long shape and bluish-white color, about one twelfth of an inch in length. They are hatched in about three days. The larvæ are little worm-like creatures, having no feet, and lying coiled up like a ring: they are diligently fed by the workers, until, in about five days, when large enough nearly to fill the cell, they refuse food, upon which the attendant bees seal up the cell with wax, and the larva, spinning itself a fine silken envelope or cocoon, is transformed into a pupa; and about the eighteenth day—or, in the case of drones, the twenty-fourth day—from the deposition of the egg, the young bee, in its perfect state, breaks the covering, and issues from the cell. It is caressed and supplied with food by the attendant bees, and is believed not to try its wings until the following day. The cell from which it has issued is speedily cleaned out, and prepared for the reception of another egg or of honey. The fine silken envelope of the pupa, however, remains attached to the cell, of which the capacity thus becomes gradually smaller, until the cells of old combs are too small to receive eggs, and can be used for honey alone.

Food of the Larva.—The food with which the larvæ are supplied is a mixture of pollen, honey and water, with the addition, possibly, of some secretion from the stomachs of the workers, in which it is prepared. It varies a little, according to the age and kind of the larva, and the peculiarities of that given to young queens are indispensable to fit them for their future functions. Pollen is constantly found stored up in the cells of the hive, and is often called bee-bread.

Combs.—The combs of a bee-hive are parallel to each other, forming vertical strata of about an inch in thickness, and distant about half an inch from each other. The cells are therefore nearly horizontal, having a slight and somewhat variable dip towards the center of each comb. The central comb is generally first begun, and next after it those next to it on each side. Circumstances frequently cause some departure from this uniform and symmetrical plan, which, however, still remains obvious. Each comb consists of two sets of cells, one on each side; and it may be mentioned as an illustration of the wonderful industry of bees, and the results of their combined labors, that a piece of comb, 14 inches long

by 7 inches wide, and containing about 4000 cells, has been frequently constructed in 24 hours. The greater part of the comb usually consists of the kind of cells fitted for breeding workers, a smaller part of it of the larger or drone cells. After the principal breeding season is over, the cells of some parts of the comb are often elongated for the reception of honey; and sometimes comb of greater thickness, or with unusually long cells, is constructed for that purpose alone, in which case the mouths of the cells are inclined upwards, more than is usual with the ordinary brood-cells. When a cell has been completely filled with honey, its mouth is *sealed* or covered with wax.

Royal Cells.—These are very different, being vertical and not horizontal in their position—not hexagonal, but rather oval in form—and



COMB SHOWING BROOD AND QUEEN CELLS.

much larger than the other cells, even in proportion to the size of the animal that is to inhabit them: they are generally placed on the edge of a comb, and when they have served their purpose are partially removed, so that during winter they resemble acorn-cups in appearance.

Their Wonderful Construction.—The cells are hexagonal, or six-sided, the hexagons perfectly regular, and in this way there are no interstices between the cells. There are only three regular figures, that is, figures of which all the sides and angles are equal, bounded by straight lines, with which a space can be perfectly filled up in this way—the equilateral triangle, the square and the hexagon; and of these the hexagon is at once the most suitable for the larva of the bee in its form, and the strongest in its nearest approach to the circle. The circular form itself would

have left large interstices. The partition-wall between the two sets of cells is not a simple plane. It is made up of little rhombs or four-sided figures with two acute and two obtuse angles made to terminate in three-sided pyramids. The individual cells are not opposite each other, but the point of meeting of three sides of three cells on one side is opposite the wall of a cell on the other side. The only departure from perfect regularity in the form of the cells is in the transition from the smaller or workers' cells to the larger or drones' cells, which is managed with an equally great simplicity and beauty of contrivance. The "instinct" of a bee is equal to problems the mere comprehension of which needs an educated human brain.

Wax.—The material of which the cells are built is chiefly wax, which is at first white, but becomes brownish-yellow with age, and in very old combs almost black. Each ounce of wax represents about twenty ounces of honey. Bees' wax is now known to be produced by a chemistry carried on in the bodies of bees; and they produce wax and build combs when supplied only with honey or saccharine substances. The bees which are about to proceed to wax-making, suspend themselves in clusters in the hive, attaching themselves to each other by means of hooks with which their feet are provided; and whilst they remain motionless in this position, the wax appears to be formed, in small scales, which they afterwards take in their mouths and curiously work up with a secretion from the mouth itself, passing the wax, in the form of a minute riband, through the mouth, first in one direction and then in the opposite one, and finally depositing it in its proper place for the foundation of the comb. One bee always begins the comb alone, the rest, in gradually increasing numbers, proceed in accordance with what has been already done. The bees which elaborate and deposit the wax, do not, however, construct the cells, which is done by others, partly at least by a process of excavation in the wax deposited. It is supposed by many naturalists, that some of the working-bees are exclusively wax-workers, some nurses, etc.; but others think that there is only one class of working-bees, all ready for any kind of work according to circumstances.

Propolis.—But wax, although the chief, is not the only material of the combs. Propolis is also employed in small bands to give greater strength to the cells, the mouths of which are surrounded with it, and made thicker than their walls. This substance, which is obtained by bees from the viscid buds of trees, is also employed for more firmly attaching the combs to the hive, for closing up apertures in the hive, for covering up obnoxious substances, intruding slugs, etc., which

are too large to be removed, and for a variety of similar purposes.

Food of Bees.—This is of two kinds: the fluid secretions of vegetables contained in the nectaries of flowers; and the dust of the anthers, called by botanists the pollen, but which, when collected by bees, has received various names, farina, bee-bread, etc. Sometimes they feed on other substances, honey-dew, syrup, etc. The organs by which they collect and utilize their food are very complex.

The Proboscis.—This organ of five parts, may be considered as a lengthened tongue. It is a prolongation of the under-lip, and is rolled over the fluid aliment taking up what adheres to it, which the bee then licks up.

Mandibles and Teeth.—For mechanically dividing solid materials, the mouth is furnished with two strong mandibles or jaws, and four palpi or feelers. These are little used in eating. The teeth are two in number, and have the form of concave scales with sharp edges, are fixed to the end of the jaw, and play horizontally.

Stomachs.—The bee has two: the first a large transparent bag, pointed in front and swelling out into two pouches behind. Like the crop of birds, it receives and temporarily retains the fluid of the nectaries. No digestion or other change in the food is detected here. From this reservoir the food or honey may be thrown back into the mouth and deposited in cells or imparted to other bees. For digestion, a second stomach is provided.

Collection of Pollen.—The pollen, or fertilizing dust of flowers, is collected by bees for the purpose of feeding the young, stored in cells till needed, then partly digested with honey, and a kind of chyle formed of it. When natural pollen cannot be had, the bees will eagerly take farina of rye, chestnuts or pease. This is not done by the mouth. The feathered hairs with which their bodies are partially clothed, and particularly those of their legs, collect the pollen, which adheres to them, and it is brushed into a hollow on the outer surface of the first joint of the tarsus of each of the hinder pair of legs. This joint is very large, compressed, and of a square or triangular form—a unique conformation. Drones and queens are destitute of this conformation, which they do not need.

Their Senses.—These, with the exception of taste, are very delicate. In full daylight they have the sense of vision in great perfection. A bee lights unerringly on the flowers in search of nectar or pollen, and as unerringly finds its own hive. Their hearing is deficient in many directions, but very fine in others, and they seem instantly to understand and obey certain audible signals hardly distinguishable by men. Their smell,

too, is acute. They proceed immediately toward honey concealed from their view. Some odors are highly obnoxious; that of their stings provokes to immediate rage. They recognize instantly a stranger bee by the sense of smell.

Their Antennæ.—But their sense of touch is very fine, and the antennæ are of the greatest importance in receiving and conveying impressions. These have many articulations, are very flexible, and can readily embrace the outline of any object, however small, the bee wishes to examine. Different naturalists credit these organs with the sense of hearing and of smell, as well as of touch; and it is possible that they are organs of some sense to which we are strangers. By these instruments the bee can execute so many works in the totally dark interior of the hive. By their aid, it builds its combs, pours honey into its magazines, feeds the larvæ, and ministers to every want which it appears to discover and judge of solely by the sense of touch. They seem also the principal means for mutual communication of impressions. The different modes of contact constitute a kind of language, susceptible of a great variety of modifications, and able to supply every sort of information for which they have occasion.

Their Extreme Sensitiveness.—Bees cannot exist in an impure air. The inside of a populous hive scarcely differs in purity from the surrounding atmosphere. Ventilation is kept up by the rapid vibration of the wings of a certain number told off for the purpose, who fasten themselves with their feet to the floor of the hive and imitate the action of flying, so that the force which otherwise would carry them through the air, drives back the air in a powerful current. A few occasionally perform this service on the outside of the hive near the entrance, but the larger part are thus engaged inside. Sometimes twenty are thus occupied at once, and the work is done by relays. The motion of their wings is so rapid that they cannot be seen except at the extremities of the arc of vibration, which is at least 90°. Their perceptions of heat and cold are very delicate. A temperature of 40° Fahr. will so benumb a bee that it cannot fly, and it will soon perish unless restored to a warmer atmosphere. But in a hive when the external temperature is 20° below zero, the bees may be found in a solid lump of ice, yet, with returning spring they awake to renewed life and activity. They live the winter through in many cold parts of Russia, in hollow trees, with no attention. Many bees which are thought to die of cold in winter really die of famine or damp. They show by their conduct that they are sensible of changes in the weather before we are. Huber supposes that it is the rapid diminution of light that warms them.

SWARMING.

Preparations.—The spring is the commencement of the swarming season, in which the parent hive sends out new colonies. No swarming takes place while the weather is cold, or until the hive is well stocked with eggs. The queen-bee, in consequence of the great number of eggs she has been laying, is now reduced to a more slender shape, and is well fitted for flight; her aversion for the royal brood and the vain attempts she makes to destroy them in their cradle, in which attempts she is constantly repelled by the guardian bees, produce in her a restlessness and agitation rising to delirium. This is communicated to the workers; they hurry to and fro in the combs with evident marks of impatience. The heat of the hive increases, and a general buzz is heard. While this state of things continues, preparations are making for the approaching expedition, and provisions are collected in greater quantity by the workers.

The Swarm Departs.—On the day on which the swarm goes off, few of the workers roam far, but several of them are seen performing circles in the air. On a sudden the noise is hushed, and all the bees enter the hive; this silence announces their immediate departure. A few workers appear at the door, turn toward the hive, and striking with their wings, give, as it were, the signal for flight. All those who are to emigrate rush toward the door, and issue forth with wonderful rapidity, rising in the air and hovering, as if to wait for the assemblage of the whole troop; then having selected a rallying point, generally on some tree or bush, they alight, and are joined by others till all are collected in one mass. If the queen is not with the cluster, the bees soon find it out, and disperse to search for her. Unless she is with them, all go back, and the expedition is deferred until the next fine day. If the queen is lost, they have to remain a fortnight or so and take the next queen, in which case the swarm is larger than at first. After a rest on the landing-place just mentioned, and finding their queen with them, the mass soars again in the air, and makes swiftly to the spot their guides had selected, their wings creating a loud and acute-tongued hum.

Succession of Swarms.—The parent hive, thus deserted by its queen and so many workers, goes busily to work at repairing its loss. The bees quietly pursue their labors, the young brood, quickly maturing, fill up every deficiency; and young queens, allowed their liberty, in turn conduct off new swarms. One man reports that he had twenty-two swarms in one year from a stock of bees which he carried home in his hat from

the woods to his garden. But as a general thing, one swarm in a year is enough; and when modern hives are used, further swarming may be prevented by destroying all the queen-cells but one, after the issue of the first swarm.

The Honey.—Honey undergoes slight modifications and chemical changes in the bee's honey-bag, but retains the flavor and aroma of the flower from which it is extracted. Thus it will be seen that the plants and aromatic flowers of certain districts will produce honey which will be highly prized, and the plants and flowers of other districts will produce unwholesome honey from their noxious or poisonous nature. Honey contains a little wax, pollen, extractive matter, mucilage, gum, manna, grape-sugar, acid and the odor of flowers. When first drawn from the comb it is quite fluid, but in time it will "candy" as it is called, the glucose separating from the solid parts. The glucose is identical with grape-sugar. However, the solid and fluid parts do not greatly differ. With age honey crystallizes and becomes yellow. The adulterations of honey are many and varied. That from "corn-sugar," or glucose, is the most common, and difficult of detection. You may detect chalk, starch and other solids by heating the honey, as the deleterious matter will settle to the bottom. Pure comb, capped by the bees, commands a much higher price than strained honey, as, of late years, the filling of old combs with glucose has been so largely practiced.

THEIR STING.

This very remarkable organ consists of two long darts, with a protecting sheath. A venom-



BEE-STING HIGHLY MAGNIFIED.

A, sting of bee; S, sheath of sting; F, end of sting, greatly magnified, showing six barbs curved upwards; B, glands for secreting poison; C, ducts through which it flows to D, where it is kept ready for use; O, circular dilatation to prevent sting being thrust too far out of sheath.

bag is connected with it, and powerful muscles for its propulsion. The wound appears to be

first made by the sheath; along which the poison passes by, a groove, and the darts, thrust out afterwards in succession, deepen the wound. The darts are each furnished with a number of barbs, which render it so difficult to withdraw them quickly, that bees often lose their lives by the injury which they sustain in the effort. The drones are destitute of sting.

The poison is said to owe its mischievous efficacy to certain pungent salts. If a bee is provoked to strike its sting against glass, a drop of poison will be discharged; and if this is placed under a microscope the salts may be seen to concrete, as the liquor dries, into clear, oblong, pointed crystals.

NUMBER AND WEIGHT.

Hunter counted 2160 drowned bees in an ale-house pint, so that a swarm of two quarts will number about 9000. Reaumur found that a collection weighing one ounce consisted of 336 bees, and that therefore a pound would consist of 5376 bees. A hive is made up of all the way from 5000 to 60,000 units. In a well-proportioned hive, containing 20,000 bees, there will be 1 queen, about 500 drones, and the remaining 19,499 workers.

THE INTEREST OF THE SUBJECT EXHAUSTLESS.

Wherever the student investigates bees, whether in their structure or their habits, the farther he goes, the more he finds. Perhaps there is no living creature whose history and life are so curious. As Agassiz wrote volumes on Turtle's Eggs, so an instructed naturalist might write volumes on almost any single point of the bee's organization and modes of living.

THE BLIND INVESTIGATOR.

Perhaps no one man has contributed so much to the general stock of information as to the constitution and habits of these industrious insects, as FRANÇOIS HUBER, born at Geneva in 1750, whose intense application to study brought on total blindness, which was never cured. He married a wife who deeply sympathized with and assisted him in his special studies, and by her aid, together with that of his son Pierre, and a peasant, Burnens, whom he trained to the work of observation, he carried the knowledge of bees many steps forward. Wherever one reads on this interesting subject, his name is continually occurring, and his authority is great.

BEE-KEEPING AND MANAGEMENT.

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PLANTS ADAPTED TO BEE-PASTURAGE.

The prevalence of honey-bearing plants must be carefully considered in deciding what number of hives may be profitably kept. Garden flowers are not, as is often supposed, a prolific source from which bees get honey. Of the clovers, the sweet, or red, and the Alsike are eminent for their honey-bearing qualities, while the white clover is valuable only as bee-pasturage. The white and Alsike bloom in June and July, but the red clover is useless as bee-food until the second growth blossoms, after hay has been made of the first crop. The bee-keeper must be governed by the prevalence of bloom in his particular neighborhood, in estimating the number of swarms which may find forage during April and May—a very trying time for bees.

Corn is the great honey-producing plant all over the West, until August, and until frost appears, when buckwheat takes its place, and during the later season the wild flowers are available. Sumac and white sage are valuable in California, while the cotton-plant is a prolific source in the South. In various parts of the country, mustard, rape and milk weeds yield honey abundantly.

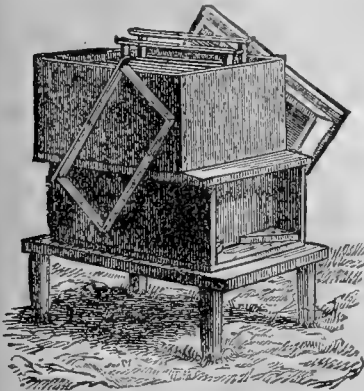
SUCCESSION OF PASTURAGES.

The first trees to produce bloom in the spring are the red and white maples, the aspens and willows. South of 40 degrees, the red bud (Judas-tree) is prolific in its bloom. May gives us alder, sugar-maple, haws, crab-apple and nearly all fruit-trees and bushes. In May and early June we have the barberry, grape, white-wood, (tulip-tree), sumac, and during June the

wild plum, raspberry and blackberry; July gives us basswood, Virginia creeper and button-bush. In the hilly regions of the South all these trees thrive; many of them are not found in the West. In California the pepper-tree and red gum are noted for late bloom. When there are plenty of these plants the bee-keeper need fear no lack of bloom, even leaving out of account others not mentioned here.

HIVES.

The hive should be closely jointed and strongly fastened together. In its construction study simplicity first. About 4000 cubic inches should be its contents, if comb-honey in frames is desired; 2000 cubic inches or even less will an-

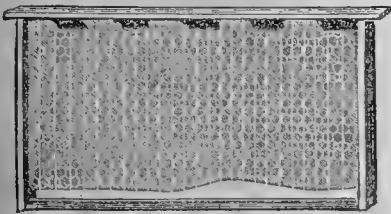


MOVABLE-FRAME HIVE.

swer if the surplus honey is to be contained in caps. We give a cut showing a hive that any one who can use carpenter's tools can make, or the several parts can be bought, ready to put together, of any firm dealing in bee-keeper's supplies. It is called the Langstroth hive. Its working-parts are easily adjusted; it comes as near as possible to being moth- and vermin-proof: no hive can be entirely so.

MOVABLE FRAMES.

We give, herewith, two illustrations, showing different styles of movable frames, the smaller



MOVABLE FRAME FILLED WITH COMB.

one having but a few cells of comb in it, the larger one completely filled. Six or eight inches square is the size of the smaller, which when filled with comb will hold about a pound of

honey. Placed side by side and joined together, a number of them will occupy the same space in a hive as a larger frame. Of course the more convenient for handling are the small frames; by their use honey can be sold in small quantities, frame and all, to suit retail buyers.



SMALL FRAME.

ENGLISH STRAW-HIVES.

In Great Britain, where the bee-keeper does not wish to closely examine the habits of his bees, the old-fashioned straw-hive, so long common as the emblem of industry, still holds its



SIMPLE FORM OF BEE-HIVE. WITH CAP REMOVED TO SHOW GLASS TOP.

own. In some parts of Europe, cork hives are used, and in Turkey and Greece they are made of earthenware. Our English friends think that a good straw-hive is a better protection to the bees and the honey than one of wood. We give a cut of a hive popular with them.

PROFITABLE NUMBER OF SWARMS.

Don't get too many swarms. When a few swarms are kept, the bees are healthy and give plenty of surplus honey because there is plenty of foliage for them to make it from. When the swarms are increased too largely, the result is, of course, light crops of honey, diseases, and all imaginable pests, and finally starvation. Great care and breeding artificially may, to be sure, prevent this where the farmer has the time to devote to it, but he seldom has this time. Twenty is the largest number we have been able to keep, and keep profitably and healthily, even on the most prolific of feeding-grounds. Indeed the greatest profit with the least outlay has been from ten to twelve swarms, and some locations will not support more than half this number. Five or six swarms may be kept on almost any farm-range.

SWARMING.

It is well for every farmer to have his bees swarm as early in the season as possible. The old "saw" says:

"A swarm in May is worth a load of hay;
A swarm in June is worth a silver spoon;
A swarm in July is not worth a fly."

Always bear this in mind. Early swarms become populous, and have plenty of honey before the dry season and heat cut off the supply of food, and are able to carry themselves through. Late swarms are weak, and finally succumb to the inevitable.

HIVING SWARMS.

When you are working around bees avoid all hasty or quick movements. These provoke stinging. If by any means a bee gets crushed or pinched in your clothing, it will sting you; otherwise there is little danger unless you go about the work in an excited manner. In case you are stung, get out of the way quietly and as quickly as possible, before the odor of the sting excites the whole swarm. An ounce of prevention is better than a pound of cure. Protect yourself as much as possible by putting on the hands leather gauntlet-gloves and tying them firmly about the wrists, tying the pantaloons tightly around the legs of the boots, and wearing thick loose clothes. A bee-veil is an ordinary piece of netting tied or sewed about the rim of the hat and tucked inside the coat-collar, etc. If the bees are settled upon a handy bush, simply shake them carefully into the hive, as many as you can, having of course got your hive all ready beforehand. Cover the hive, and place it near where the other bees may enter. If the larger part of the swarm falls to the ground, drive them to the entrance by gently and carefully sweeping them with something soft. When they begin to enter, leave them to themselves until evening, when they must be set where they are to remain permanently. In case of the swarm settling on a limb so far up that you cannot reach it, tie one end of a rope around the limb, and throw the other end up over a higher limb, passing it to an assistant on the ground. Then saw off the limb, easing on the rope so that the limb will fall gently to the ground, that it may not disturb the bees. Put the bees into the hive as already directed. You will seldom lose a swarm if you keep your eyes open and hold yourself in readiness when indications of a swarm are apparent. The beating of tin pans and throwing of water and sand among the swarms is useless. But in case of their rising up and seeming inclined to make off, a good dash of water or sand will often bring them to the ground, doubtless because they

think it a bad day for swarming. Swarm-catchers are sometimes used: a bushel-basket on a long handle makes a good one.

GETTING THE HONEY.

Wait until you are sure the bees are filled with honey before you try to work about them. Being alarmed in any way, as tapping on the hive or smoking, they will at once fill themselves with honey. Let them get filled—it will not take above five minutes—and they will be quiet, and will not sting unless hurt. Now remove the



HONEY-KNIFE.



BELLOWS AND SMOKING-TUBE.

honey, paying no attention to the flying bees. If you do, they will sting you. We give a good cut of a popular form of smoker. Very little smoke answers the purpose: a few whiffs from an ordinary tobacco-pipe will answer. If the honey sticks, cut it with a thin knife as shown in the cut.

CARE OF BEES IN WINTER.

A shelter facing southeast, and having water-tight roof and three sides, is the best place for bees all the year round, the open front being protected by shutters or otherwise to keep out the snow in winter. The hives should stand about a foot above ground, and sometimes in severe weather be protected with straw or corn-stalks. Bees, as before stated, endure extreme cold when healthy, and with plenty of food. Wet and snow among them are fatal.

FEEDING BEES.

A multitude of appliances have been invented for this purpose. But the old simple way is as good as any. Take a common wide-mouth pickle-bottle; fill it with syrup, and tie over a double fold of net. Or invert the bottle on a piece of perforated zinc, over the feeding-hole of the hive. The supply can be regulated by the number and size of the holes. In cold weather instead of syrup use barley-sugar, made by boiling for ten minutes two pounds of loaf sugar in a pint of water, adding a little vinegar to prevent crystallization. It is poor economy to stint the bees in food. In the early spring slow and continuous feeding will stimulate the queen to ovi-

posit, by which means the stocks are rapidly strengthened and throw off early swarms. It is a singular fact that if stimulating feeding has been for some time pursued, and the supply be cut off and nothing coming in from the fields, the bees will destroy all the young larvæ and eggs, instinct seeming to teach the wise insects that the resources of the colony will be insufficient to feed the young.

WATER.

An abundant supply of water is essential to the health of bees. They consume a large quantity, and often stop to drink at the edge of stagnant pools, and seem even to prefer putrid and urinous waters to purer streams, as if their saline and pungent qualities were grateful to them.

ROBBER-BEES.

With all their intelligence, bees are sometimes oblivious of the claims of *meum* and *tuum*. When a hive is too weak, or perhaps attracted by the odor of broken comb, or food placed near the hive, sometimes other bees will attack and rob it. Take the hive thus menaced to a cellar or other cool dark place and keep there a couple of days, putting a similar hive in its place, on the bottom of which rub wormwood. Sometimes making the entrance of a hive so small that only one bee can enter or leave at once will break up the robbery, and sometimes breaking the comb in their own hive will make the robbers give up their designs.

THEIR ENEMIES.

Of these the bee-moths are the worst. They penetrate the hives, lay their eggs which hatch into cocoons and caterpillars, and live in honey, eating it and filling the comb with webs; meanwhile protecting themselves in a sort of silken sack which they spin. The hive should be

examined daily from May 1 till late in the fall. In the evening they hover about and try to enter the hives. Shallow dishes holding sweetened water and a little vinegar, placed near the hives, will catch many of them, and hollow sticks and little shells are often placed on the bottom board to receive their eggs. Rats, mice and spiders will sometimes attack bees.

FOUL BROOD.

A disease with this name is very destructive to bees in the larva condition; they die in their cells and become putrid. The disease is infectious. Drive out the bees into a new clean hive; it is the custom in some locations of Europe to put and keep them a day in a temporary hive before placing them in the new one, where they are to live. Foreign honey fed to bees should be previously scalded.

PROFITS.

Great stories are told of the profits sometimes derived from bee-keeping: 130 hives are reported to have made \$1800 profit in a season, and 90 others \$900. A single colony is reported to have given a profit of \$35 in a season. A province in Holland is said to have an average of 2000 hives to the square mile. It is estimated that in 1865 there were in Attica, Greece, in an area of 45 square miles, 20,000 hives.

ITALIAN BEES.

The Italian or Ligurian bee, heretofore referred to, is said to be a much more profitable bee to keep than the common black bee. Langstroth reports his Italian bees as gathering twice as much honey as the common bees. Quimby says he has not had a single unfavorable report from them. They thrive in high latitudes, and are peculiarly adapted to the climate of Oregon and Washington and the mountains of California.

THE GARDEN AND ORCHARD.

GARDENING.

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ANTIQUITY OF GARDENS.

Horticulture (Latin, *hortus*, a garden, and *cultura*, cultivation), or the art of cultivating gardens, is a very ancient art. At the very threshold of Hebrew antiquity, man was put into the "Garden of Eden," to dress it and to keep it. On the monuments of Assyria and Egypt, most interesting and elaborate representations of gardens are preserved. History has brought down to us the record of the hanging gardens of Babylon and the floating gardens of Cashmere and Mexico. From the earliest times great attention was paid to them in Assyria, Chaldea, Palestine, Persia, Japan, China and India; and references to them are continually to be met with in all literature.

CHOICE OF SITUATION.

Where circumstances permit a choice, a garden ought to be as fully as possible exposed to the rays of the sun, and a gentle slope to the south, southeast or southwest is preferable to a level. Its form, unless some peculiarity of situation determines it otherwise, is usually a parallelogram; and it is considered desirable that it should be longer from east to west than from north to south, in order to have as much as possible of the best exposure. A brick wall is the best inclosure, next a good hedge, or a fence.

PREPARATION OF THE SOIL.

The soil of a garden should be prepared with a degree of care almost impossible to apply to a whole farm. A deep, rich and easily penetrable soil is desirable; and where it can be afforded, the soil of a garden is sometimes almost entirely artificial; more generally, means are used for bettering the original soil. Of

these means, one of the most important is trenching, by which the soil is deepened, and it is desirable that the soil of a garden should be at least three feet deep. The proper depth of trenching, however, depends on the original depth of the soil and the nature of the subsoil; where the soil is pretty uniform to a considerable depth, the deepest trenching is advantageous; and the available soil may often be deepened by incorporating a portion of the subsoil with it; but if too much of a subsoil unsuited for vegetation is at once thrown up by trenching, it may communicate its own barrenness to the soil, before it is mellowed by exposure to the air, manures and the processes of cultivation. A stiff clay soil is very unsuitable for many of the crops required in a garden, and ought to be mixed with as much sand and vegetable matter as can easily be procured, both at the formation of the garden and afterward.

DRAINAGE AND WATER.

It is of course necessary in all cases that a garden be thoroughly drained. It is also of great consequence to have the means of irrigation, or at least of abundant watering, which, even where the climate is generally moist, greatly tends to increase the product in dry seasons, and is almost always necessary to the perfection of certain crops. Indeed, if water can be obtained to form a small pond, or to pass through the garden as a rivulet, it may not only be turned to account for purposes of ornament, but also of utility; in the production of many plants which cannot be successfully cultivated otherwise. The use of water is far from being so common as it might be in our gardens; even a cranberry-patch, although a pleasant thing and

of easy attainment, being seldom thought of. The Chinese are better acquainted with it, and cultivate aquatic plants to an extent that has never been equaled among any other people.

MANURING.

A liberal supply of manure is necessary for a garden; the kinds of manure must be accommodated to the soil and to the different plants, and must often also depend in part on other circumstances. Care must be taken not to overdose with guano, or indeed with strong manure of any kind, by which plants may be killed rather than nourished. Farm-yard or stable manure ought in general to be subjected to a process of decomposition in heaps before being used, and great advantage is derived from mixing it with other substances to form composts. Nor ought any of the weeds and other refuse vegetable products of the garden to be thrown away or burned, but all should be gathered into some designated corner, there to decompose and form a heap of vegetable mould, which is for many purposes one of the best manures that can be used.

DELVING AND CROPPING.

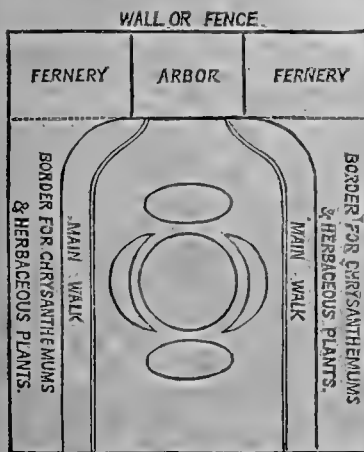
A garden ought to be delved or dug with the spade in the end of autumn, except where the presence of a crop prevents, the ground being left very rough to expose the soil as much as possible to the influences of the weather. When the crops are planted in spring, a slight stirring of the surface is all that is required. The usefulness of a garden, however, is much increased by making a considerable part of it produce crops nearly the whole year. Of course, constant cropping requires frequent and abundant manuring; and care must be taken that each crop be succeeded by one of a totally different kind: a rule which is indeed applicable as far as possible to agriculture as well as gardening.

LAYING OUT.

The garden, if in the form of a parallelogram, is usually divided into smaller ones, and these into plots and beds for different kinds of plants. Paths within the plots, intended only for a single season, may be made by merely treading with the feet. The permanent walks should be more carefully made, usually by throwing out the earth to the depth of eight or ten inches, and filling the place with stones, cinders, broken bricks, slag or some such substance containing no nutriment for plants, and covering this again with gravel. The borders of the plots are often occupied by currant and gooseberry bushes.

A SPECIMEN PLAN.

A plan is here subjoined. Of course, situation and other circumstances so far vary that you



GROUND PLAN OF GARDEN.

may not be able to adopt this style; still you may derive such lessons from it as will assist you in carrying out a different design.

TOOLS NEEDED.

A pair of soft leather gloves, a spade, a small hand-fork, a trowel, a Dutch hoe, a gallon water-pot, a garden-line, a peck rubbish-basket, a hammer, a draw-hoe, a dibble, a rake, a small pair of shears, a three-foot rod, a pair of pruning-scissors, a garden-knife, a wooden basket for seeds, etc., a wooden mallet and an apron with a pocket in front. If the tools can be kept in a sheltered spot near the garden during the summer months, it would be an advantage; in the winter, when not required, they should be taken indoors, and after being cleaned, the parts liable to rust should be oiled with a brush and marked, for sake of distinction, with the initials. It would be well to be provided with a good deal of box, divided into compartments, for containing the small tools and other sundries, as flower-sticks, labels, pegs, string, nails, shreds, tallies and seeds, which should be properly arranged, so as to allow of ready access to them in the busy season.

FORMING THE GARDEN.

The gratification of your taste must be determined by the space at your disposal. The edgings on each side of your main walks should be of such a kind that, in case of heavy rain, they will prevent the soil being washed into the walks. Box edgings are not desirable, as, from frequent raking and brushing, they are apt to decay; thus gaps are left here and there, which can only be

properly replaced by planting the whole afresh. Bricks are to be discarded. A rustic edge formed of round pieces of wood, cut in equal lengths, and fastened in close together with a mallet, is good and easily repaired. Ivy and all kinds of growing edges harbor slugs, snails and other varieties of destructive vermin. Some of the ornamental tile-borderings for flower-gardens are very pleasant to the eye, answer all purposes, and with care will last for years.

FLOWER-BEDS.

If you have sufficient space for flower-beds, let them be of the oval and circle shape. A raised bed or mound in the center of the garden for growing flowers relieves the flat surface. The size and number of the beds must accord with the extent of your garden. With flower-beds you can better harmonize the colors by massing them; that is, supposing you to have a piece of ground each side of the center plot, these portions may be devoted to the culture of the chrysanthemum, herbaceous plants, etc. If you have not this advantage, it would be better to dispense with beds, and plant on the mixed system, practicing as much method as possible in the arrangements of color, height, season of flowering, etc., so as to have few blank spots throughout the year. If you design beds, there will be no need to employ the same labor and materials in making the walks that encircle the beds as in the case of the divisions. A slight coat of gravel to distinguish them will suffice, as it is possible that in the following season you may alter your plan. This can be more readily accomplished if the walks are not made for permanent use. The edgings round the beds can be made of a very hardy plant, viz., *Cerastium tomentosum*, which can be propagated in the spring by division, and planted two inches apart. It will increase and spread very fast. Do not let it flower, but keep it evenly clipped with the shears both in width and height. You need not afterwards disturb it, except for the purpose of reducing it.

A RUSTIC ARBOR.

Against the fence, wall or similar shelter in the rear of your garden, construct a rustic arbor; in the absence of such an advantage, form a back with little difficulty of upright stakes well secured in the ground; the sides the same; but the roof should be willow or ash stakes, as they bend to any shape. Dip the ends of the stakes to be inserted in the ground in tar previously, as it will preserve them for a greater length of time. In splicing the stakes, notch the parts where you tie them together; the same with the stiff rods used as cross supports to the upright. Having

erected the arbor, make a seat inside, where in the hot days of summer you may read and study. The flooring can be made of small stones, collected at convenience, and may be formed into some device. Select some species of climbing plant to cover the arbor. Hops are pretty and rapid in growth; but they often become so infested in the autumn with green fly, as to make them unpleasant to handle. As annuals, nasturtiums, convolvulus major and scarlet runner are suitable.

FERNERIES.

Each side of the arbor raise a mound of earth. The under portion can be composed of any rubbish which makes a good drainage; over this form a rockwork, either with stones, blocks of wood, stumps of trees or any similar material that can be obtained. On this, when finished, plant a collection of ferns. They do not require a great depth of soil, but like their roots screened from the scorching rays of the sun; their fronds develop themselves luxuriantly in shady nooks; though fond of moisture, they dislike being saturated. Syringing or watering with a fine rose at the close of a warm summer day is what they delight in.

CALENDAR FOR THE YEAR.

Having executed your plans in the formation of the garden, and quite prepared it for the reception of plants, you must now consider how you shall furnish it with those kinds of plants that will make it attractive and interesting, not only at the present but at all seasons, and that you may do so we will begin with the year, and say something of what is to be done in every month of it.

January is a month in which very little can be done out of doors, unless you can on favorable days benefit the soil by digging in any leaves or other nutritious substances you may have collected in a heap during the autumn in some out-of-the-way corner. If not sufficiently decayed, you had better turn it over three or four times with your fork before you use it. In digging, the rougher you leave the soil for the present, the more will it be benefited in the future. Be careful not to disturb crocuses, snowdrops, or any other bulbous roots you may have planted, as they are fast pushing upwards; especially the snowdrops. It is to be hoped that you have marked their positions by carefully-written labels. If you have any plants whose roots are likely to be injured by the frost, as hardy fuchsias or tea-scented roses, cover them with some coal-ashes.

Your leisure time in the house should be employed in making pegs with sharp points from old birch brooms, making and painting flower-

sticks, and preparing labels, as in a few weeks you will be requiring them. During the summer months you will have kept a memorandum of any improvements that may have been suggested to you: now is the period to prepare for carrying them out. Do not clear away the decayed fronds or leaves that may be deposited on the surface of the fernery, as they are a protection to the future fronds. A little earth sifted over them will prevent them being scattered by the wind. If you have a small frame for keeping calceolarias, stocks, etc., it would be a great help. Protect them by coverings from severe frost, but on all fine days admit air and pick off withered leaves.

February.—Let your spare moments be employed in the same way as recommended last month. Any bulbs, such as tulips, etc., that are not planted, should be during the first fortnight of this month.

March.—You may now divide any perennial and herbaceous plants which you may wish to lessen or increase. Never let any of this kind of plants get too large, because they rob the soil of its nutritious properties. No garden is complete without that beautiful autumnal flower, the chrysanthemum. Now is the season to propagate it. The dwarf or pompone varieties are most desirable for small gardens, because they flower early and in more profusion than the larger varieties. Three or four rooted pieces will make a good patch; but, if you cannot obtain that number, one will do, as, by stopping the shoots at intervals, till the beginning of July, it will make a nice plant. They are fond of plenty of water, and rich manure applied to their roots.

If you can do so, you might grow one of each in a pot. They should be managed thus: as soon as the stem has made five or six eyes, pinch off the top. It will then push out shoots from each eye, which train and tie to neat sticks as they grow. When they have made four joints, stop them again. Thus treated, by the autumn you will have good bushy plants, either for decorating your window or presenting to your friends.

You should now stir the soil with the Dutch hoe and level it with your rake preparatory to the sowing of seeds. If you possess a frame, sow asters, stocks and sweet-peas in pots. In doing so put plenty of drainage in the pots and fill them with soil to within an inch of the edge; then with a rose give the soil a good soaking of water. Then you may sow the seed, covering it with some fine mold, intermixed with a little silver sand. Keep them shaded till they begin to grow. This will prevent them from requiring water till they have vegetated, as frequent waterings previously are apt to rot the seed.

You should now think of purchasing any seeds you may require, as all annuals do better if sown not later than the first week in next month. The present is the proper season to prune rose-trees. Cut the strong shoots back, leaving three of the dormant buds.

April.—The garden is fast becoming cheerful. Polyanthes and wallflowers are now beginning to bloom freely. The annuals must be sown without delay. Use a small hand-fork for loosening the soil after you have sown the seeds. Pat them in the earth with the back of the fork. As soon as they have grown so that you can handle them with your thumb and finger, pull up the weakest and leave the remainder an inch or more apart; after which, if the days are warm, you may, towards evening, sprinkle them with a fine rose. If the earth is rich with manure, they will grow strong and weedy, in which case they will exceed their usual height. As they progress, it would be advisable to stick a few pieces of birch or brushwood among the weakest growers, to enable them to withstand heavy rains and wind.

May.—Get some of the bedding varieties of plants. Do not select strong growers, as they often yield the least flowers. The dwarf sorts of scarlet geraniums, calceolarias and verbenas are in general the most abundant bloomers. There is a dwarf white flowering dahlia, named *Alba nana*, that needs no sticks to support it, and will continue to produce a great quantity of flowers till the frost destroys them. It is useful to cut from for bouquets.

Keep the ground free from weeds by the use of the Dutch hoe. Do not give your young plants too much water, but a gentle sprinkling over their foliage of an evening: such practice refreshes them very much, besides cleansing their leaves of any dust that may accumulate. Tulips will be in bloom this month. If you wish to prolong their beauty, you must contrive some kind of covering to protect them from the rays of the midday sun and heavy showers.

June.—The summer roses will be in full bloom this month. Keep the buds clear of green fly, for which purpose use a soft brush or feather; look also for the maggot. The curling of the leaf is a certain sign; examine it, and you will find the insect. It destroys the bud by piercing a hole in it; therefore the leaves must be constantly watched. Pinks will now be in perfection. Keep them tied to neat stakes, and if you want large flowers you must pick off some of the smaller buds where there are more than two or three on the same stalk. The white variety is easily propagated, and much grown on account of its scent. For increasing them by cuttings, cover the soil about an inch deep in silver sand,

then put a propagating-glass over them, and shade them till rooted, which you will observe by their commencing to grow. Then gradually admit air till you entirely remove the glass. Attend to the training of your climbers; put sticks to your sweet-peas. You may by the end of this month dig up the tulip or any other bulbs you may desire, dry them, after which clean and put them in bags till required for planting.

July.—If you wish to bud any rose with other varieties, this is a favorable month for the operation. Remove decayed flowers and seed-pods from your annuals and other plants; it will extend their time of flowering. Your geraniums will be fast coming into bloom. If very hot weather, give them a liberal supply of water. Endeavor to keep your garden in good trim; tie and peg all plants that require it. If by accident you should break a geranium-shoot, put it in the ground; it will root. You must discontinue syringing or sprinkling plants in flower, as it damages the bloom and causes them to lose their flower. When using the Dutch hoe, don't let it go in too deep, or it will injure the roots. Uproot all annuals that have done flowering; attend to the training of the shoots of your chrysanthemums. If they and the dahlias get attacked with earwigs, have a thumb-pot, put some dry moss in it, and lodge it in the plant or on the stake that supports it; every morning take the pot out, remove the moss, and empty the contents into water or crush them with your feet. Cloves and carnations may now be increased by laying. The operation is simple: loosen the earth about the plant with the hand-fork, then make a cut half-way across the third joint of a shoot, then peg it into the soil.

August.—Bedding plants may be said to be at their best during this month. If the weather is very dry, continue to water freely. If you have, or can obtain, convenience for wintering geraniums or such-like plants, you should commence propagating them during the early part of this month: they will root in the open ground or in pots out of doors. You may increase the number of your violets by division. Choose the time when we are likely to have warm showers, as they will assist them to root at once. Select a shady spot on which to plant them. Proceed to note in your memorandum such alterations or arrangements as you may wish for another year.

September is apt to be a humid month; plants grow very fast; less water is needed. French and German asters will be in perfection. When they have attained their full size, cut them for bouquets, that will increase the size of the after-blooms. Supply the roots of dahlias with plenty of water; cut out all weak shoots; gather

the seeds of plants you may wish to save, as they are now ripe (you can clean them indoors at your leisure). Plant wallflower, sweet-william, etc.

October.—Although many plants are yet gay, still the beauty of the greater number is on the decline. Towards the middle or latter part of this month you may expect sharp frosts; place any plants that you have struck, or any others that need protection, so that, should there be signs of a frost, you can immediately protect them. Many plants, such as fuchsias, scarlet geraniums, etc., will exist in a room during the winter, where they can be properly secured from the admission of frost, and you must keep them from growing till the spring, by not giving them more water than will just keep them alive. Cuttings of yellow calceolarias will now root quickly in coarse sand. They need no other protection than a cold frame for preserving them during the winter. Chrysanthemum buds will be swelling fast. Towards evening search for and destroy earwigs. If you want fine flowers, pick off all small buds, leaving one to each shoot. In tying them out, afford all the room you can for each stem.

November.—As leaves fall, collect them together in a tidy heap, and by turning them over often during the winter they will become excellent manure for your garden in the spring. This is the best month in the year for planting tulips, crocuses, hyacinths, and other bulbs. Tulips and hyacinths should be planted six inches deep; the smaller bulbs three inches. If you have a spot that you could plant a line of crocuses in three rows of distinct colors, say yellow, white or striped and blue, the effect when in flower will be dazzling. Dig up your dahlia roots, and after allowing the water to drain out of the flower-stalks, hang them up in a cupboard or cellar where the frost cannot penetrate. If you have not that convenience, put them in a box, and cover them with dry sand.

December.—Any stalks or refuse of plants can be consumed by fire: the ashes will improve the soil if mixed with it. Now the trees have shed their leaves, clean up and put your garden in tidy order.

ONLY AN APPROXIMATION.

Of course, this calendar cannot be accurately followed, but allowances must be made for differences of position and climate, and for variations in the seasons. When the dilettante asked the painter Opie what he mixed his colors with, the gruff answer was, "With brains, sir." Any gardening calendar will have to be taken with the same condiment.

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SCOPE OF THE SCIENCE.

The Greek word from which botany is derived, having the same letters as the English, came originally from a root meaning to feed, and describes plants considered especially as food element, or as fodder. The English word has come to mean, the science which treats of the structure of plants, the functions of their parts, their places of growth, their classification, and the terms which are employed in their description and denomination. It examines the plant in its earliest opening of development, when it appears as a simple cell, and follows it through all its stages of progress until it attains maturity. It takes a comprehensive view of all the plants which cover the earth, from the minutest lichen or moss, only visible by the aid of the microscope, to the most gigantic productions of the tropics. It marks the relations which subsist between all members of the vegetable world, and traces the mode in which the most despised weeds contribute to the growth of the most mighty denizens of the forest. And as plants are not distributed at random over the globe, geographical peculiarities have to be studied, and their lesson deciphered from the fossil remains of plants which have come down to us from earlier geological ages. Like every other science, the domain it has to conquer is practically unbounded. And it shades off on every side into kindred sciences; so that thoroughly and exhaustively understand it, is no less than to comprehend—not merely to “accept,” as Margaret Fuller said she did—the universe.

ITS EARLY LITERATURE.

From the earliest history to which we have access, we find, as we should naturally expect to find, the human mind occupying itself with the matters here presented, especially in their more

pronounced and prominent features. Chaldeans Egyptians and Greeks long ago were busy with its problems, though of course their speculations were crude, and included theories as to the change of plants into animals. The wise Solomon “spake of trees, from the cedar that is in Lebanon, even to the hyssop that springeth out of the wall.” Three centuries before Christ Theophrastus wrote a “History of Plants,” and described about five hundred species used for the treatment of diseases. Æsculapius and his priests, the Asclepiades, studied plants from a medicinal and pharmaceutical point of view. Dioscorides, a Greek writer in Nero’s time, produced a work on *Materia Medica*. Pliny the Elder described about a thousand plants, many of them famous for their medicinal virtues. Asiatic and Arabian writers also took up the subject. But little, however, was actually accomplished till the revival of learning in Europe in the sixteenth century. Branfels, a physician of Bern, has been regarded as the restorer of the science in Europe. He published, near the beginning of the sixteenth century, a “History of Plants,” illustrated by figures.

ITS LATER LITERATURE.

From that time onward, there has been a constant succession of observers and investigators, whose name is legion. Andreas Cesalpinus, in Italy, divided the 1520 plants known in 1583 into fifteen classes, distinguishing them by their fruit. Prominent names in the seventeenth century are John Ray of England, and Dr. Robert Morison of Scotland. In the eighteenth century the number increased fast. The best known name is that of Linnæus (his real name was Carl von Linné), a Swede, born in 1707. His system is founded on the sexes of plants, and is usually known as the sexual system. Although it was a great advance in his time, and even now

has a certain facility of application which commends it to the tyro, it is an artificial method, and does not propose to unite plants by natural affinities. It is useful as an index to a department of the book of nature. He himself so regarded it; and performed some tentative work looking toward a natural method of arrangement. At his death in 1778, there were known 11,800 species of plants. Another great name in this department in the seventeenth century was Antoine Laurent de Jussieu, botanical demonstrator in the Jardin des Plantes, Paris, who went on from Linnæus, and made important advances in the principle of classification. Robert Brown, a Scottish botanist; Dr. (afterwards Sir William) Hooker, of Glasgow; John Lindley, Robert Kay Greville, Dr. Walter Arnott and a host of others, carried on the work. Goethe in Germany, and Charles Darwin in England, stand out prominently.

BOTANIC GARDENS.

The Botanic Gardens, founded in the sixteenth and seventeenth centuries, did much to advance botany. These were first appropriated chiefly to the cultivation of medicinal plants, especially at the universities, where medical schools existed. The first Botanic Garden was established at Padua in 1545, and next came that of Pisa. That at Leyden dates from 1577, that at Leipsic from 1579. Florence and Bologna early had their gardens. The garden at Montpellier was founded in 1592, that of Giessen in 1605, of Strasburg in 1620, of Altorf in 1625, of Jena in 1629. The Jardin des Plantes in Paris was established in 1626, and the Upsal Garden in 1627. The Botanic Garden at Oxford was founded in 1632. And so on, till at the end of the eighteenth century there were 1600 Botanic Gardens in Europe.

PLANTS AND ANIMALS.

Some of the ancients, as already noted, speculated on the change of plants into animals. Perhaps they "builded better than they knew." For although no plant, regarding it as a separate conscious existence, was ever transformed into an animal retaining that consciousness; it is true that plants are transformed into animals, and that animals could not otherwise exist; and from a purely human point of view, this seems the purpose for which plants are, their "final cause." A plant is a being which derives its sustenance from the mineral kingdom, the earth and the air. Only plants can convert these into nourishment. They create the food on which animals live. The lifeless mineral material which would be poisonous to animal life they work over, and transform into matter capable

of being taken into a living organization. The sun itself, without the aid of plants, could not feed an animal, could not produce an animal to feed, with all the materials in the world at its beck. Animals lay hold of what plants have prepared for them, transform it more or less, make it over into structures which manifest powers and vitality of a higher order. But they can originate no organic matter. Plants perform their all-important work only in their green parts, and under the light of the sun. Thus they decompose carbonic acid and water, liberating oxygen gas to renew and purify the atmosphere for the breathing of animals. What they retain, they make over into permanent plant-structure, into cell-walls, or into starch, sugar and the like, from which cell-walls may be made. These same mineral elements, together with some form of combined nitrogen, they convert into proteine or protoplasm, the vitally active part of living plant-cells, of which the flesh of animals is built up.

CELLS.

All plants are built up of parts, diverse in form, but essentially of one nature, and of which the structure is made as an edifice is of brick, the brick in this case being hollow. These organic constituents of a plant are called cells. A mass of plastic vegetable matter, of minute size, builds around itself a wall or shell, and this wall or shell remains permanent, although the living part that built it around itself has disappeared. This is a cell. An oak tree began its existence in an ovule of the parent, as a single such cell. The great central fact is, that this living vegetable cell has the power of multiplication. As it grows, it divides into two, and each of these again into two, and so on. In some low forms of plants, these cells, as they increase, each becomes a separate individual. But in higher plants the cells build up a structure composed of distinct organs, as stem, leaves, root; and the cells themselves develop in various shapes, many-cornered or round, drawn out into tubes, and with thinner or thicker walls, varying from the most delicate growing fiber that hardly holds itself together, to the shell of a cocoanut or the wood of the lignum-vitæ tree.

EXOGENOUS AND ENDOGENOUS.

Woody fibers, all the anatomical elements of a tree or herb, are made up entirely of cells and their conformations, however diverse the form and texture. These, variously combined, arranged and modified, make up the particular anatomy of stems, leaves and roots. In the stems of flowering plants the distribution of the woody portion is upon two plans. One, that of common wood, is in concentric layers around a

pith and within a separable bark, and each year adds a new layer, outside that of the previous year. This is the *exogenous* stem, or outside-grower. In the other, of which the palm is a type, the wood does not grow in annular layers, but in separate bundles, interspersed in the pithy or cellular part through the whole diameter, not in apparent order, but more accumulated toward the outside. As the newer wood was thought to be added toward the center, this stem was called *endogenous*, or inside-grower.

FLOWERING AND FLOWERLESS PLANTS.

Among the higher plants the reproductive organs are, in ordinary language, comprehended under the term flower, and as they are conspicuous, such plants have been denominated *Flowering*, *Phanerogamous* or *Phanogamous*. Among all cellular plants, and in some vascular plants, as ferns and equisetum, there are no flowers, and the reproductive organs are inconspicuous; hence they have been termed *Flowerless* or *Cryptogamous*. In all cases the young plant, or embryo, is completely cellular. But as growth proceeds, that differentiation takes place which distinguishes the several classes of plants one from the other. In phanerogams the first leaves produced upon the embryo plant are termed primary, seed-lobes or *cotyledons*. In some cases these are two in number, and are opposite one another. Plants in which this occurs are *dicotyledonous*, as ordinary forest-trees. In other plants the lobes alternate, and only one cotyledon is formed; such are *monocotyledonous*, as grasses and lilies. In cryptogams, on the other hand, no such seed-lobes or cotyledons are produced, and they are *acotyledonous*.

THE BINOMIAL SYSTEM OF NOMENCLATURE.

Botanists are greatly indebted to Linnæus for the system of naming by which, ever since his time, plants have been known. Their description before his method came into use involved a vast amount of inconvenience, now happily done away with. His hit was to give to a genus the name of one word, and that a noun, as say *Pyrus*, apple; and to the species the name of an adjective, as *coronaria*, crab—*Pyrus coronaria*, crab-apple. This is following the analogy by which men are named, except that the order is transposed in the two cases. When the name of a man is transposed, as, in a directory, Darwin, Charles, it follows Linnæus' system of naming plants. If the student sees *Morus*, he knows the word means a mulberry. When he reads *alba* after it, he recognizes the white mulberry, as in *Morus multicaulis* he recognizes the Chinese

mulberry, on which the silkworm feeds. It would seem that so simple a nomenclature must have always existed. But it did not, until Linnæus. There was a time when there was no figure 0, or cipher. How would the human race have got to its present condition if the omnipotent nothing had not been created?

SPECIES.

In all classification it is necessary to define what is meant by species. The usual definition has been that a species is an assemblage of individuals having characters in common, and coming from an original stock or protoplast, and their seeds producing similar individuals. It was also supposed that variation in species was restrained within certain limits, and that varieties had a tendency to revert to the parent form. The view, however, adopted by many nowadays is, that the tendency to variation is continuous, and that, after a lapse of long periods of time, and under the influence of varying external conditions, the descendants from a common stock may exhibit the differences which characterize distinct species. These are the views advanced by Darwin, and they imply a complete revolution in our idea of species.

BENTHAM'S STATEMENT OF THE MODERN THEORY.

1. That, although the whole of the numerous offspring of an individual plant resemble their parent in all main points, there are slight *Individual* differences.
2. That among the few who survive for further propagation, the great majority, under ordinary circumstances, are those which most resemble their parent, and thus the *Species* is continued without material variation.
3. That there are, however, occasions when certain individuals, with slightly diverging characters, may survive and reproduce races in which these divergencies are continued even with increased intensity, thus producing *Varieties*.
4. That in the course of an indefinite number of generations, circumstances may induce such an increase in this divergency, that some of these new races will no longer readily propagate with each other, and the varieties become *New Species*, more and more marked as the unaltered or less altered races, descendants of the common parent, have become extinct.
5. That these species have, in their turn, become the parents of groups of species, that is *Genera*, *Orders*, etc., of a higher and higher grade, according to the remoteness of the common parent, and more or less marked, according to the extinction or preservation of unaltered primary, or less altered intermediate forms.

NO LEAP OR BREAK.

As there is thus no difference but in degree between a variety and a species, between a species and a genus, between a genus and an order, all disputes as to the precise grade to which a group really belongs are vain. It is left in a great measure to the judgment of the systematist, with reference as much to the use to be made of his method as to the actual state of things; how far he should go in dividing and subdividing, and to which of the grades of division and subdivision he shall give the names of Orders, Sub-orders, Tribes, Genera, Sub-genera, Sections, Species, Sub-species, Varieties, etc., with the consequent nomenclature.

A FIELD FOR CONJECTURE.

Such a systematic arrangement is founded on a hypothesis which, so far as the present flora of the globe is concerned, has not been demonstrated. Conjecture is hazarded as to the present epoch of the earth's history by extending back to unlimited ages. If the theory is consistent with what we see around us, and is founded on plausible grounds, then we must think that we have ascertained the secret of the growth of things, and may say with Kepler, "I think thy thoughts after thee, O God."

WHAT IS KNOWN.

A Whole Plant.—Let us go and pluck the first flower we see blooming—no matter what, so long as it is in bloom. It will not answer to have the blossom only, with just a few inches of the stalk, but the whole plant must be taken up, the fragments of mold carefully shaken from the roots, and the plant laid before us. It has a root, a stem—perhaps also branches, which are only offshoots or parts of the stem—leaves and flowers. This is the enumeration of the parts of the plant which any one unacquainted with botany would give. It is often difficult to determine exactly where the stem ends and the root begins. The root is, in fact, only the lower and underground portion of the stem. Some botanists call the root and stem together the *axis* of the plant; whatever name is adopted, there is a very close connection between them. It will be better for us now to regard them as distinct parts.

The Root.—Let the reader think of all the different forms of root which he has ever seen, and class them together in his own mind under two groups, namely, those which are simple, or are merely single continuations downwards of the stem; and those which are compound, or composed of two or more parts starting from the same point. As, for example, the radish, the carrot, the turnip and the dandelion, have all

single roots. They may be branched as they go down into the soil, but they are only single continuations of the stem. On the contrary, the dahlia, the onion, and many of the grasses possess a bunille of roots starting from the same point, which are sometimes branched, and sometimes not. Although these kinds and many more are all roots, they have a very different appearance; and while it is quite correct to call them all roots, if we would distinguish one kind from another, we must have a name for each which will indicate its character, without giving us the trouble of making a drawing of the root, or using a long description. It is necessary to use words or terms which all botanists understand. Being agreed that for the different forms of roots different words should be employed, we will enumerate the most common.

Forms of Simple Roots.—A carrot and a parsnip are familiar examples of a kind of root which is thick and fleshy above, gradually tapering downward to a point, like an inverted cone. Hence such a one is appropriately called a *conical* root. But if the root, instead of being largest at the top, thickens toward the middle and then diminishes again downward, so that it decreases in both directions, like the roots of many varieties of radish, it becomes spindle-shaped, and is called a *fusiform* root. The turnip has a root, however, which resembles neither of these, and when well grown is nearly the shape of a boy's top. This may be called a turnip-shaped root, but the term generally employed is *napiiform*, the word *napus* being the Latin for "a turnip." The common form of simple root, which proceeds downward as a continuation of the stem, without enlarging, but becoming gradually thinner and thinner, often much branched, occasionally with only thread-like rootlets issuing from its sides, is known as a *tap*-root. It is not distinctly conical as in the root of the carrot, and is the commonest form of root amongst herbaceous plants.

Compound Roots.—Of compound roots, or those in which a bundle of little rootlets proceeds from the base of the stem, a tuft of grass, or, still better, a stem of wheat or barley, affords an example. These rootlets, or little roots, being thin and thread-like, the tuft is called a *fibrous* root. When the rootlets are thickened, so as not to be thread-like or fibrous, but are still clustered together in a kind of bundle, it is called a *fasciculated* root, from the Latin word *fasciculus*, which is often employed in botany, and means a little bundle. There are modifications of form in the rootlets which compose the fasciculated root, as in the dahlia, in which each rootlet is thick, fleshy and of a fusiform shape; in some others a portion only of the rootlets are thick-

ened or swollen either once or several times throughout their length.

Bulbs and Tubers.—The bulb of the onion, the white lily, and many similar plants, is not a root, but a kind of bud composed of scales closely overlapping each other, and growing upon a button-shaped stem, from the under surface of which the fibrous root is produced. The potato (that portion which is cooked as a vegetable) botanists do not class as a root, but as a *tuber*, or swelling of the underground stem.

Age of Roots.—Some roots last only one year, and are said to be *annual*; others last two years, and are called *biennial*; whilst others continue in vigor a longer period of time, and are said to be *perennial*.

Uses of Roots.—The roots of plants serve a twofold purpose: to attach the plant to the soil, and to furnish it with the means of sustenance. For the latter purpose, the extreme ends of the thin fibers of the rootlets are of a more delicate and spongy texture, and by their means water, and the materials diffused through water, are taken up and conveyed to the plant. These spongy ends of the rootlets are called the *spongioles*. Certain plants possess the power of producing additional roots, or organs having some of the functions of roots, according as they may be required for the purposes of the plant. These organs are termed *adventitious* roots, which, in the ivy, are like suckers growing from the stem to attach it more firmly to the tree or wall which supports it.

The Stem.—From the root of our plant proceeds the stem. This is a part essential to flowering plants. Sometimes the stem is so short that it can scarcely be distinguished, but it is commonly a very prominent feature. Whether this stem stands erect, or supports itself by twining around or clinging to another, or lies prostrate upon the ground, it is still a stem. If we cut across any stem, branch, or twig of a woody plant, such as a tree or shrub, we shall find, amid a great variety in detail, a uniformity in plan in trees and shrubs. The outer circle or circumference will be the *bark*; the inner or central point, the *pith*; and between this pith or *medulla* and the outside bark, the woody portion is deposited in layers, which appear as rings when a section of the stem is made, with lines called *medullary rays* cutting them from the center to the circumference. This is the structure of all *exogenous* plants.

Runners, Rhizomes and Tubers.—It has been said that all stems are not erect. It may be added that all stems are not produced above the surface or the soil, for some few have a subterranean habit, and others scarcely creep above it. If we watch the growth of strawberry plants in the

garden, we shall observe what are termed “runners” (botanically *flagella*), which are stems running along the surface of the soil, rooting at the joints, and still running on. Or, if we attempt to root out the garden-mint, we shall find similar runners under the surface (called in this case *soboles*), sending down roots at the joints, and sending up leaf-bearing branches to the surface. Yet again, the purple flag or common iris affords an example of another kind of immersed or semi-immersed stem running upon the surface, or near it, and bearing thread-like roots from the under surface and tufts of leaves at the extremities of all the numerous branches. This kind of subterranean stem is a *rhizome*, though most commonly called a root by all except strict botanists. The most anomalous of all subterranean stems is that of the potato, and we doubt if the consciences of botanists are quite at rest on the subject. The tubers are regarded as swellings of an underground stem; and this opinion is strengthened chiefly by the fact that these tubers are capable of producing buds, a power which true roots do not possess. A negative character of roots may thus be noted: they do not possess scales, which are modified leaves; or buds, which are rudimentary leaves; or nodes, joints or points, whence buds are developed.

Leaves: their Structure.—Leaves are so variable in form, passing into each other by such gentle gradations, that we shall only be able to indicate the most prominent types. If we take the leaf of an oak, a lily, and a hart's-tongue fern, we shall see in each of these, especially if we hold them up to the light, certain thicker portions like threads traversing the leaf: these are usually called the *veins*. In the oak-leaf the veins are much branched and spread over the leaf in a kind of network: such kinds we will call *net-veined* leaves; in the lily-leaf the veins run parallel, side by side, from the bottom towards the top of the leaf, with finer veins crossing from one to the other of the longitudinal veins; a leaf with such a veining, or venation, we will call a *parallel-veined* leaf. In the hart's-tongue fern the veins, although all going direct toward the margin of the leaf, divide in a regular manner into two parts like a fork: such leaves as possess this type are called *fork-veined* leaves. Of these three kinds of veining or venation, the net-veined leaves belong to exogens, the parallel-veined leaves to endogens, and the fork-veined leaves to ferns. Ferns are not flowering plants. The veining of leaves is by no means an uninteresting subject; there is a beautiful variety in their mode of distribution through the leaf, and some of the prettiest natural objects ever exhibited under a glass shade are the skeleton leaves of plants. In the

growing leaf all the spaces between the veins are filled up with cells, which contain, amongst other things, the green *chlorophyl*, or coloring matter, of the leaf, and these are covered by the delicate and transparent cuticle, or skin.

Shapes of Leaves.—In the common scarlet geranium, the leaves are attached to the stem by a long stalk. There is the leafy expanded portion, which is the blade, or *lamina*, and the footstalk, which botanically is called the *petiole*. On each side of the petiole at its base, where it joins the stem, is a little, scaly, triangular, leaf-like blade, without a footstalk. These are not leaves, but appendages to the leaves, called *stipules*. Let us go in search of all the different-shaped leaves which we can find, and ascertain how far we can give names to the principal forms, so that by a name which all botanists can understand we may distinguish one kind of leaf from another.

Simple and Compound Leaves.—Leaves may be classed in two groups. The leaves of the geranium, dandelion, daisy, maple, hazel, plum, apple, etc., we place on our left hand: these are all simple leaves. The leaves of the horse-chestnut, the ash, the mountain-ash, the acacia, trefoil or clover, wood-sorrel, etc., we will place on our right hand: these are compound leaves. What are the differences in the two groups? In the group of simple leaves the blade, or lamina, of all the leaves, whatever their form, or however deeply they may be cut at the edges, is not cut down to the mid-rib, or great central vein of the leaf; hence we call them *simple*. In the other group, each leaf is divided into two or more parts or leaflets, which look like smaller leaves clustered together upon the footstalk, or petiole. In the clover there are three of these leaflets; in the horse-chestnut, five or seven; in the ash, a great many. But in all these instances there is but one leaf, which is composed of several leaflets: these are compound leaves.

Simple Leaves.—The simplest forms of simple leaves are those of fir trees, which are long and narrow, like needles, sometimes called "pine-needles," three or five bound together at the base in a little bundle. The name by which such leaves are known is *acicular*, from a Latin word meaning "needle-shaped." In the yew tree the leaves are less needle-shaped, being broader below and coming to a sharp point at the apex; they are awl-shaped, and the term by which they are distinguished is *subulate*, which has that meaning. For our next example, we leave the large trees and descend to grasses, or little plants which possess leaves resembling the leaves of grasses, such as the grass-leaved stichwort, in which the leaves are long and narrow, of the same width throughout, except at the two extremities, and

these are said to be *linear*, or resembling a line. (Plate A, Fig. 1.)

Various Forms of Simple Leaves.—Leaves are called *lanceolate* when their form resembles the head of a lance, broadest in the middle and attenuated towards each end; of such a leaf the lanceolate plantain (Fig. 2) affords an example.

Egg-shaped leaves, which are broadest near the base and narrowed upwards, are said to be *ovate* (Fig. 3); but if the footstalk is reversed, and the lamina, though still egg-shaped in outline, has its broadest part at the apex, it is called *obovate* (Fig. 4). There are constantly to be found forms of leaves which are intermediate, and glide insensibly from one to another of those which we have enumerated; indeed, the forms of leaves are almost infinite, and all we can hope to do is to establish a few types. There are, for instance, oval and elliptical leaves, and leaves which are nearly round. In all such cases it is better to refer them to the mathematical forms which they most closely resemble, and call them by their names. Circular or orbicular leaves have generally the petiole or footstalk attached in the center of the under side of the disk, and are called *peltate*, not from the form of the leaf, but from the mode in which the petiole is attached (Fig. 17).

The few remaining forms of simple leaves with which we can associate names are: those which are kidney-shaped, and hence are called *reniform* (Fig. 6); heart-shaped leaves, which are termed *cordate* when the petiole is attached at its broadest extremity (Fig. 5), but *obcordate* when the smallest end is attached to the petiole, as in the case of each leaflet of the wood-sorrel (Fig. 7). Other leaves are named after the objects to which they are supposed to bear the closest resemblance, as spoon-shaped, or *spatulate*, in the daisy (Fig. 10); arrow-shaped, or *sagittate* in the water-arrowhead (Fig. 8); fiddle-shaped, or *panduriform*, as exemplified in the fiddle-leaved dock.

All the simple leaves above enumerated have their edges but little, or not deeply, cut. There are, however, very many forms of simple leaves which are irregular, and so deeply cut as at first to resemble compound leaves. Five-angled leaves, such as those of the ivy, are *quinquangular* (Fig. 13), and those with a larger number of angles are described by the number of angles which they possess. Halberd-shaped leaves with two small lobes at the base are called *hastate* (Fig. 11). Leaves with lobes at the base are common, and vary in their form (Figs. 21 and 21a). Three-lobed leaves in which the leaves are nearly equal are called *trilobate* (Fig. 9); and with five lobes, *palmate*, because they resemble the fingers and palm of an open hand (Fig. 14). But

the larger number of these deeply-cut leaves are too complex and variable to be named definitely, except by the number and form of their lobes or their incisions.

Compound Leaves.—The first example taken of compound leaves is a *ternate* leaf composed of three leaflets: these leaflets may be *obovate* as in clover (Fig 12), or *obcordate* as in the wood-sorrel (Fig. 7), or indeed of any other form. If each leaflet is again divided into three parts it is *biter-nate*, or if thrice divided in a like manner, *triter-nate*. When there are five leaflets spreading like five fingers, the leaf is called *digitate*. By far the largest number of compound leaves are more or less of the *pinnate* type, such as the leaves of the ash (Fig. 15): the name "pinnate" is given to them because the arrangement of the leaflets on each side of the petiole or footstalk resembles a feather (Latin *penna*), when the leaflets are in pairs placed opposite to each other on the footstalk (as in the ash), the leaf is said to be *oppositely pinnate*, but when an alternate arrangement is followed it is *alternately pinnate*.

Arrangement of Leaflets.—The arrangement of leaflets may be still more complex by being further subdivided. In this case each leaflet of a pinnate leaf is itself pinnate, and when so divided the leaf is termed *bi-pinnate* (Fig. 18). If the subdivisions are carried still further, and each leaflet is again divided, the leaf is called *tri-pinnate* (Fig. 19). When the divisions are car-



PLATE A.

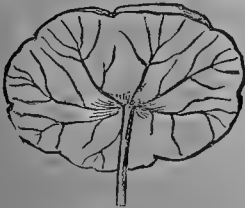


FIG. 17.

ried beyond this, the leaf is called *supra-decom-pound*.

It has been stated, in reference to the geranium leaf, that the lamina, or blade, was supported upon a footstalk, or petiole. This is not always the case. If the common teasle is ex-

amined, the leaves (which are placed opposite to each other on the stem) will be found to have the lamina, or blade, of one leaf united at the base to that of the other, forming a kind of cup



FIG. 18.

or hollow of the leaf around the stem. When pairs of leaves unite thus at the base, they are said to be *connate*. The upper pairs of leaves in the caper-spurge, and in one species of honey-

suckle, are connate (Fig. 20). The blade, or lamina of the leaf is, in some instances, continued down the stem of the plant for some dis-



FIG. 19.

tance, and is said to be *decurrent*; in other instances it only surrounds and embraces the stem, and is *amplexicaul* (this is derived from a Latin

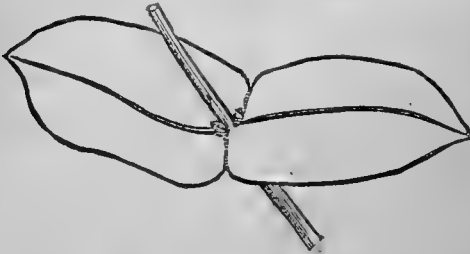


Fig. 20.

word, *amplexus*, which means, in English, "embracing." (Fig. 21a.)

Edges of Leaves.—Taking up the edges of leaves, irrespective of their general form, in the ivy



FIG. 21.

leaf we find that the margin is perfectly smooth or *entire*; but in very many other instances the edges will be jagged or notched, finely or coarsely, and in different ways in different plants. In

many instances the edges of leaves are notched or toothed like a fine saw, or *serrate*; when the teeth are larger, and each tooth is again notched or serrated, the margin is described as *bi-serrate*. More rarely the teeth around the edge of a leaf, instead of having one side longer than the other, have both sides equal, and are said to be *acutely cernate*. If, instead of being pointed, the teeth are rounded or convex, the edge of the leaf is *crenate*; but if concave depressions alternate with pointed teeth, in such case the margin is

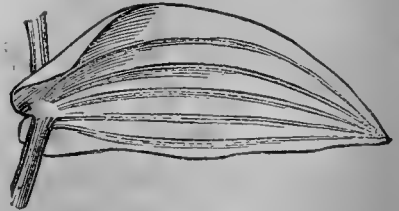


FIG. 21a.

called *dentate*. The edge of a leaf may be *ciliated*, or fringed with delicate hairs like eyelashes, or irregularly waved and *sinuate*, like the leaves of the common oak. The leaves of the dandelion are like none of these, but the large teeth are directed backward, not unlike the teeth of a pit-saw, whence they are termed *ruinate* (Fig. 22). Usually, if the serratures of

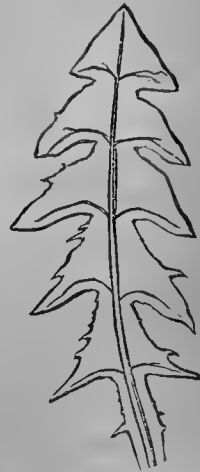


FIG. 22.

a leaf are small, they may be referred to one or other of the forms above indicated; but if large, they are more variable, and described as *lobes*.

Arrangement around the Stem.—The arrangement of the leaves around the stem should be carefully observed, because there is more variety in this than would at first be imagined. We have already intimated that some leaves are arranged in pairs *opposite* to each other, and others singly and *alternate*. It will also be found that three or more leaves will grow in a circle or

whorl around the stem (Fig. 23), and that when the stem is square and the leaves in pairs, each alternate pair will be directly above each other, which is called *decussate*. If a young branch is plucked from an oak, and we look down upon it, the leaves will in that position seem to be in a whorl of five leaves, but examined sideways they will be found to be single, and so arranged that five consecutive leaves will describe a spiral passing twice around the stem before a leaf is



FIG. 23.

found placed directly over the first, and this will be the sixth. In other plants the spiral contains fewer or more leaves, and goes either once or several times around the stem before a leaf is reached which is placed directly over the leaf from whence the spiral is traced.

Modifications of Leaves.—Modifications or appendages of leaves take the form of stipules, tendrils and thorns. When first alluding to the leaf of the scarlet geranium, we directed attention to the pair of triangular leaf-like appendages which were placed, one on each side, be-

(Fig. 24). In such plants as the wood-angelica and the wild carrot the base only of the petiole embraces the stem, and this form is called an *ochrea* or *boot* (Fig. 25). The wild brier, and other wild roses, have stipules adherent to the petiole, or *adnate* (Fig. 26), and some plants have no visible stipules. In the hawthorn they are leaf-like, or *foliaceous* (Fig. 27). When they are present the plant is described as *stipulate*, and when absent, *extipulate*.



FIG. 27.

Thorns.—Thorns are sometimes alterations of stipules, sometimes projections from the cushion upon which the base of the petiole rests, and sometimes terminate small branches.

Tendrils.—The whole blade of a leaf is occasionally absent, and the leaf becomes transformed into a tendril. In the case of pinnate leaves, only the upper leaflets will sometimes become tendrils, and in other cases the stipules may be converted into tendrils. It is interesting to examine the tendrils of different plants, and to endeavor to ascertain what other organ has been converted into these forms. It must be borne in mind that all the parts of plants can be referred to some change or modification in either the stem or the leaves.

Flower-Buds.—Flower-buds proceed from the *axils* of leaves. The axil is the angle formed by the junction of the leaf with the stem. Such leaves are termed floral leaves, or *bracts*. Occasionally the bracts are of the same color and form as the remaining leaves of the same plant, but generally they are smaller, and altered in form. In a few instances they are colored. If we gather a daisy or a dandelion, we shall observe just beneath the head of flowers, and closely pressed to the under side, a whorl or circle of little green leaves or bracts, and this whorl of bracts is termed an *involucre* (Fig. 45). The cap of an acorn is a kind of involucre composed of numerous scaly bracts.

The Flower.—The gayest and most attractive feature in the majority of plants is the flower; and though so variable and in some cases so curious in its form, it is not difficult to refer all



FIG. 24.



FIG. 25.



FIG. 26.

tween the bases of the petioles of the opposite leaves. These appendages are the stipules, which in some cases are so small as to be reduced almost to hairs, whilst in others, as in the garden-pea, they are much larger than the leaflets or leaves. If we pluck a stem of grass, and remove one of the long narrow leaves, the entire petiole will be found converted into a kind of sheath which embraces the stem, or *culm*

the parts composing it to four organs, two of which are external and two internal: the former are the *floral envelopes*, and constitute the showy portion of the flower; the latter are the *essential organs*, and are principally concerned in the production of the fruit and the reproduction of the species. If we return again to our scarlet geranium, we shall notice beneath the scarlet leaves (petals) of the flower a long greenish tube, expanding at the top into five green spreading lobes: this is the *calyx*. It occupies the same position as the involucre of the daisy. In this instance the calyx is green, but if we take another familiar example in the fuchsia, we shall find the calyx is colored. The beautiful pendent blossom of the fuchsia (if we take the common red, and purple variety) has externally a crimson tube with four spreading, crimson lobes: this is the colored calyx, and within this is the purple *corolla*, or petals. The two external or floral envelopes, therefore, are called the *calyx* and the *corolla*, of which the latter only most usually is colored; but in some instances both. The fuchsia may sometimes be seen with the lobes of the calyx partially or wholly green. The lower portion of the calyx is either united into a tube, as in the scarlet geranium, or all the parts, or *sepals* as they are called, remain separate and distinct. In some instances, as in the mallow, there is a double series of sepals, forming a kind of double calyx, of which the outer series is termed the *epi-calyx*. As might be anticipated from the variety of form in flowers, the form of the calyx is very variable. In the nasturtium it is spurred, in the Chinese primrose it is inflated, and also in the bladder campion; but in composite flowers, to which the dandelion and daisy belong, the calyx is reduced to fine hair-like threads. The bright yellow *eschscholtzia*, a great favorite in British gardens, has a singular kind of calyx. As the flowers open, the conical calyx which incloses the corolla breaks away at the base, and is borne upward like a cap or extinguisher on the petals, and is soon thrown off.

Petals.—The inner series of floral envelopes, or corolla, which is generally the showy portion of the flower, consists either of several distinct parts or leaves, called petals, or all these are more or less united together into one piece. When the petals are distinct, so that they can be plucked off one by one, some of them are occasionally larger, or of different shape from others in the same flower, and called *irregular*. Other corollas have the petals all alike, and are, therefore, said to be *regular*. If we take a wild dog-rose, a bramble-flower, or a strawberry-flower, we can count in each five separate and distinct petals, of the same size and form (Fig.

28). These flowers have, therefore, a regular corolla of distinct and separable petals, and botanists would call such a one a "regular polypetalous corolla." But supposing that we collect a pea-flower, and pull off the petals, we still find that there are five, and that we can separate them one from the other; yet they differ in size and form: first, the one large erect upper petal called the *standard*, then the two side petals called the *wings*, which are smaller, and finally the *keel* of two petals, sometimes partially united. All these together form an *irregular*



FIG. 28.

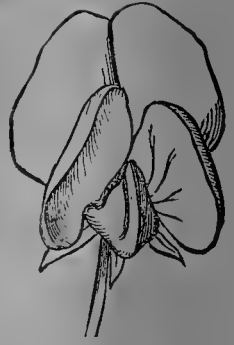


FIG. 29.

corolla of distinct and separable petals, or, technically, an "irregular polypetalous corolla" (Fig. 29).

The Corolla.—When the petals of a corolla are all united into one piece of a regular and symmetrical form, as in the bluebell, heather, convolvulus, or primrose, it constitutes a regular corolla with united petals, or, in three words, a *regular monopetalous corolla*. But, though regular, these vary much among themselves, for the corolla of a bluebell is bell-shaped, or *campanulate* (Fig. 30); that of many kinds of



FIG. 30.



FIG. 31.

heath is urn-shaped, or *urceolate*, being contracted at the mouth; the corolla of the convolvulus is funnel-shaped; that of the primrose and phlox, flattened, or salver-shaped (Fig. 31); and some others *tubular*, with scarcely any expansion at the mouth. All these are, nevertheless, regular in their form, but there are others which are irregular.

If we examine a daisy, we shall find not only that what is commonly called the flower is a cluster of more than a hundred flowers (Fig. 32), but that these are of two forms. The yellow flowers in the center, which are termed "the florets of the disk," are regular and tubular (Fig. 33); whilst the white flowers (composing the fringe



FIG. 32.

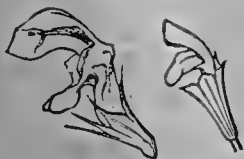


FIG. 33.



FIG. 34.



FIG. 35.

—"florets of the ray") are irregular and *ligulate* or strap-shaped (Fig. 34).

A similar structure prevails in the dandelion, and other flowers of the natural order of *Compositæ* (compound flowers). The ligulate, or strap-shaped florets afford one example of an "irregular monopetalous corolla." That common garden-flower, the yellow *calceolaria*, has another form, in which the lips are hollowed out like a slipper. The dead-nettle, ground-ivy and mint have another form, in which the corolla has two unequal lips, and is called *labiate* or lipped (Fig. 35). A still closer resemblance to a closed mouth will be found in the toadflax and snapdragon. All these are forms of an "irregular monopetalous corolla."

Varieties of Corolla.—The corolla of flowers is sometimes all in one piece, and is then called a *monopetalous corolla*; but when divided into separate and distinct petals, it is called *polypetalous*. If the form is regular, or the petals all alike in shape and size (though they may differ in color), the corolla is called *regular*; but if the upper part of a corolla has a different form, or size from the lower, or the petals are unequal, the corolla is said to be *irregular*. In some plants—the garden tulip, for instance—there is apparently only one floral envelope, composed of six equal-sized petals, colored alike, and hardly to be distinguished from each other. Three of these are outside the three others, and belong to the calyx, the inner three petals forming the corolla. In such cases it is not usual to distinguish the sepals from the petals, or the calyx from the corolla, but to call the whole six flower-leaves together a *perianth*.

Stamens and Pistil.—If we pick off the petals from a flower plucked from our pet geranium,

we shall see therein, standing at the top of the tube, six thread-like bodies side by side: five of these are all alike; the sixth, which stands in the middle, is different. The five are called *stamens*, and the one which is unlike any of the rest is the *pistil*. There are other flowers, equally common, in which we shall be able to distinguish them better. Let us try a honeysuckle or a primrose. A stamen consists of a thread-like stalk, which is called the *filament*, and a thicker, somewhat oblong head, which is the *anther* (Fig. 36). Sometimes the filaments are more or less united, either at the base only, or nearly throughout their length, and in a few instances are so short as scarcely to be seen. The anther is by far the most important part of the stamen: it contains a mass of fine granules, which is dispersed like dust when the anther opens. This dust is the fertilizing principle, and is called the *Pollen*. In orchids, the pollen is compacted together in waxy



FIG. 36.



FIG. 37.



FIG. 38.

masses. The pistil generally consists of three parts: a base, more or less swollen, which is the *ovary*; an apex, variable in form, which is the *stigma*; and an intermediate support called the *style* (Fig. 37). The last-named is sometimes absent, and the style is sessile, or seated upon the ovary. The stigma consists of a viscid or sticky surface, to which the pollen-grains, when shed from the anthers, adhere. The ovary, which afterwards, when fertilized, becomes the fruit, is a cell containing one or more little bodies called *ovules*, which, when developed, are the seeds. When the pollen is shed from the anthers it adheres to the stigma, on which it falls or is conveyed by insects. Soon after it is attached to the stigma, each pollen-grain sends a little tube down the style into the ovary, and the end of this tube passing into one of the ovules, the contents of the pollen-grain are transferred to the ovule, which becomes fertilized, and the empty pollen-cases are dispersed. If the ovary is cut across with a sharp pen-knife, the number of ovules which it contains may be counted, and the manner in which they are arranged, deter-

mined; both of which are often required to be known in the examination of a plant. Sometimes the ovules are attached to the walls of the ovary, and sometimes at the center. Sometimes the ovary has no division, and at others it is divided into two or more cells. These are called one-celled, two-celled, or many-celled ovaries, as the case may be.

Inflorescence.—Before following the ovary to its development into fruit, we must return again to the flowers and observe the manner in which



FIG. 39.

they are arranged upon the stem. This is called the *inflorescence*. The stalk which supports a flower is its *peduncle*, and when there is no stalk it is *sessile*, or seated upon the stem. The most simple kind of inflorescence is a *spike*, in which the flowers have scarcely any peduncles, and are grouped around the upper portion of the stem, or *axis* (Fig. 38). The common plantain, used for feeding caged birds, is a familiar example. The catkins of the willow, poplar and hazel are a va-



FIG. 40.

riety of spike which is *deciduous*, or quickly falling away, and containing male flowers, or flowers with stamens but no pistils. The hop and fir-cones are also varieties of spikes with scales.

If the flowers are arranged in a similar manner on the stem, but each flower has a perceptible peduncle which, are all of the same length, the inflorescence is called a *raceme* (Fig. 39). The flowers of the currant, etc., are produced in racemes. A *panicle* is a kind of compound

raceme in which the peduncles are branched, each pedicle, or branch, of which bears its flower (Fig. 40). Several kinds of grasses produce their flowers in panicles. There is a kind of inflorescence called a *corymb*, in which the peduncles are simple, springing from different points on the axis, as in a raceme, but the lower peduncles are lengthened, so that all the flowers are brought nearly to the same level (Fig. 41). If the peduncles are branched, it becomes a *compound corymb*.



FIG. 41.

One of the most complex forms of inflorescence is the *cyme*, which should be studied in its mode of development. It is common in the stitchwort family (Fig. 42). The stem terminates in a flower, then branches arise from the axils of a pair of bracts a little lower down; these are each surmounted by a flower. In turn each of these secondary flowers is supplemented by branches from the axils of its bract, and thus the process is repeated till the shoot is exhausted.



FIG. 42.

A very characteristic inflorescence is the *umbel*, in which all the flowers are supported on peduncles of equal length, springing from the same point, but if each peduncle supports a secondary umbel, the result is a *compound umbel*, as in the carrot, parsnip, hemlock, angelica, and many other common plants (Fig. 43), which are hence called *umbelliferous*, and constitute a generally easily recognized natural order.

Another very large group of plants have an

inflorescence like the daisy and dandelion (called a *capitulum*); in which numerous flowers are compacted together upon a button-like receptacle, on which they are sessile. These form the natural order of *Composite plants* (Figs. 32 and 45).

Fruit.—It has been already remarked that the ovary when mature becomes the fruit, and that the ovules ripen into seed. What is commonly termed *fruit* includes in some instances other parts of the plant, so that "fruit," in its botanical acceptance, does not always agree with the fruit of the gardener and the cook. For exam-



FIG. 43.

ple: the bean and pea are fruits in botanical acceptance; but are not so recognized in the kitchen; whereas the strawberry includes also the pulpy receptacle, and the gooseberry and apple have the calyx and ovary united in what is termed the fruit. As fruit ripens it may divide or open, as the pea and the wallflower, and is then called *dehiscent*; but if, as the cherry and filbert, it does not open, it is termed *indehiscent*. Of each of these there are several kinds according to their structure and character; and, as the



FIG. 44.



FIG. 45.

fruit is of great importance in the classification of plants, the distinctions should be carefully remembered.

Dehiscent Fruits.—We will commence with dehiscent fruits, or those which open as they approach maturity. The *follicle*, or little bag, which opens down the inner side (ventral suture), and never down the back (dorsal suture), as in the common columbine (Fig. 44); the *legume*, opening either down the front or back, or along both sutures, as in the pea and bean (Fig. 46); the *capsule*, which opens by valves or pores (Fig. 47), and occasionally by a lid, of which the foxglove, the poppy, and the henbane are examples; the *siliqua*, a kind of flat capsule

opening by two valves (from below upwards), leaving the seeds attached on both sides of a central partition (Fig. 48), as in the wallflower and cabbage; the cone, or *strobilus* consists of a dense scaly spike, each scale with seed at the base; when mature, the scales fall back and permit the seeds to escape. It will be observed that all the kinds above enumerated are dry, and not pulpy fruits.



FIG. 46.



FIG. 47.

SECTION OF FIG. 47.



FIG. 48.

Indehiscent Fruits.—Some of these are pulpy, and some are dry. The seed-envelope (or that portion of the fruit which incloses the seed) has three layers, which are sometimes blended together and sometimes separable. When these layers are distinct, the outer is the *epicarp*, the inner is the *endocarp*, and the middle is the *mesocarp*; whilst the whole together, whether



FIG. 49.

divisible or not, is the *pericarp*. If these four kinds of *carp* are well memorized, we may proceed with indehiscent fruits which are not pulpy.

An *achene*, or *achenium*, is a dry fruit in which the pericarp may be readily separated from the seed. The fruit of the sunflower is an achenium. A *caryopsis* has the pericarp inseparable from the seed, as in a kernel of wheat. The bran which is sifted from flour is the pericarp of wheat. A *utricle* has the pericarp inflated, as in the goose-foot. A *glans* has a hardened pericarp, with bracts at the base or inclosed in an involucre, as in the acorn and chestnut. A *samara* has the pericarp winged, as in the elm, the ash and the maple (Fig. 49).

The pulpy unopening or indehiscent fruits are very easily remembered. Of those which contain but one seed there is only the *drupe*, which includes the cherry, plum and all one-seeded pulpy fruits. The raspberry and blackberry fruits are aggregated little drupes, of which a large number are arranged about a receptacle (Fig. 50). The pulpy fruits with more than one



FIG. 50.

seed are sometimes divided into four kinds, but we shall consider them as two—the *berry*, in which the seeds are immersed in a pulpy mass, as in the gooseberry, orange and melon, and the *pome*, in which the seeds are inclosed each in a separate cell, as in the apple and pear.

The Seed.—The seed contains within its own special covering the *embryo*, which may occupy the whole or only a part of the interior. This embryo consists of the *radicle* or young root, the *plumule*, or young stem, and the *cotyledons* or seed-leaves of the future plant which is to be developed from the seed. All these sometimes form but a minute point just distinguishable by the naked eye. When the seed germinates the plumule proceeds upward, the radicle downward, and the first leaf or pair of leaves which appear above the soil are the cotyledonary, or seed-leaves.

COLLECTING AND PRESERVING PLANTS.

For this there are needed a pocket-lens, a tin box, and a few quires of paper of a spongy nature, so as to absorb moisture (such as grocers employ for wrapping sugar will answer the purpose), but the size should be a little larger than that of the paper on which it is purposed ultimately to mount the specimens. A very good size for a sheet when folded in half is, 17 by 11 inches, or it may be this size and not folded, which is perhaps most convenient. A stout deal board, for the top and the bottom, and this also half an inch larger each way than the paper, should be provided. Three or four bricks tied up in brown paper will serve as weights, each brick forming a parcel. This will be all that is

really essential until the plants are dried and ready for mounting.

As ferns are very good plants to commence with, and perhaps the easiest of any to preserve, we will take them, and when the method of drying is acquired by experiments upon them, other plants may succeed.

The collection of ferns for transplanting and the collection of fronds for preservation as botanical specimens are to be pursued at very different periods of the year. For botanical purposes fronds destitute of fructification are worse than useless, unless they belong to species which produce distinct fertile and barren fronds, and in which the characters and appearance of these fronds materially differ. In such cases the two kinds of fronds should be collected and preserved together.

The period for collecting ferns for the herbarium is, therefore, manifestly that when the fructification has nearly attained to maturity, and it is always better to collect them on a dry day than on a very wet one. The collector should go out prepared for collecting ferns, if he desires his herbarium to present a neat and respectable appearance when completed. Some recommend a bag, and some a large book under the arm; but commend us to two half-inch deal boards, about 11 by 17 inches, with a strap and buckle for each end, and twenty sheets of good bibulous paper, cut to the same size, and placed between them.

Having selected a good frond or two for preservation, taking care not to break the stipe or stalk, but to separate it from the rhizome, or root-stock, bend back the stipe just below the lowest leaflet of the frond, breaking the woody portion, but not dividing it from the rest of the frond, and lay it carefully between a sheet of your bibulous paper, and secure it with the spare paper between your boards; then proceed in search of more. Fronds which with their stalks are not too long for the paper should be laid in without bending.

In selecting fronds for preservation, it is not the largest that are required, but it is rather advisable to collect such specimens as will lie comfortably between the papers without bending than to aim at procuring *fine* specimens, which may only prove to be a nuisance. A perfect frond of 9 inches in length is better than a folded or otherwise mutilated one of 19 inches. In selecting fronds, the fruit should not be too ripe, or instead of spores you will only find empty cases, not to mention the rusty dust that will continually tint your papers. It is better that the spores should be scarcely matured. Then, again, it should be noticed whether the frond is eaten by insects, broken, or in any other way imperfect. Such specimens are to be avoided if

others can be obtained. Finally, the specimens selected should be well grown, and not distorted, unsymmetrical, or exhibit a tendency to sporting, or departure from the general type of the neighboring fronds.

Having collected what specimens are required and conveyed them home, the next process consists of drying them. This is accomplished by removing them from the papers in which they have been collected and transferring them to fresh paper. The ferns should be transferred to a sheet of drying-paper; two or three thicknesses, or even four or five, may be placed upon it, and then another specimen, and thus *ad libitum*. When all are in this manner transferred, the pile should be placed in a press, or with a stout board above and below, loaded on the top with some heavy weights—stones, bricks, books or anything applicable for the purpose. Twenty-four hours at the least, and forty-eight at the most, they should remain unmoved. At the expiration of this period each specimen should be transferred to a dry sheet of paper, with three or four thicknesses of dry paper between each specimen, and again put under pressure for the same period. The damp paper from which the specimens are taken should be at once dried in the sun or before the fire. It is always advisable to change the sheet for each *variety*. The specimens should be laid on the paper with the under or fructifying surface uppermost, and the barren side of the frond applied to the paper. Small strips of gummed paper, about an inch in length, and not more than an eighth of an inch in width, should be laid across the principal and secondary ribs or branches of the frond, and each end fastened down to the sheet of paper; other pieces may, in like manner, be placed across the tips of the fronds, or wherever else appears to be necessary to secure the specimen to the paper. It may be suggested that too many such slips disfigure the specimen, and if there are not sufficient it cannot be retained in its place. Experience must be the best teacher. Some object to fastening the specimens to paper at all, others recommend gluing them down by the whole surface. Both these plans are objectionable. If the specimens are loose, they are not only in danger of being broken or damaged, but of being misplaced and dissevered from the label which belongs to them. If wholly glued down, they cannot under many circumstances be readily removed from the paper, either to be transferred to other paper or for closer examination or comparison.

Each specimen having been mounted, the label which accompanies it should be pasted down beside it. Finally, its generic and specific name should be written legibly at the lower, *right-hand*

corner. All the specimens belonging to one genus should then be collected together and placed between the folds of a sheet of paper, half an inch wider and longer when folded than the half-sheets upon which the specimens are mounted. These "genera covers" may be of the same paper, or a smooth brown paper may be employed for the purpose. On the outside of the genera covers, at the lower *left-hand* corner, the name of the genus should be written in a good bold hand. The whole may be transferred to a deal box, the front of which is movable as well as the lid, being hinged to the bottom, so as to fall down and lie flat on the table. The lid may be so contrived as to hold the front in its place when closed. A deal box, 9 inches deep, 13 inches wide and 20 inches long, will hold a good collection, and if this ever should prove too small for the number of specimens obtained, add a second box.

A little camphor may be kept with the specimens, but the best preservative will be to look them all over, and thus allow the air to have access to them, once in every six months. With such precautions a collection may be preserved uninjured for years, provided always that it is kept in a *dry* place—not moderately, but *thoroughly* dry—or "mold" may injure irremediably what insects have spared.

A neat little collection of ferns, of smaller pretensions, and less claim to be regarded in a scientific light, may be arranged in a kind of album or scrap-book, with "guards" introduced by the binder sufficient to compensate for the extra thickness caused by the insertion of the specimens. A tinted paper is often used in the manufacture of these books, which good taste may transform into a very interesting volume for the drawing-room table.

In collecting flowering plants it is essential that the plants should be collected when in flower, and, if possible, specimens in fruit should be collected and dried therewith. This will, seldom be possible, but a later visit to the same spot may furnish fruiting specimens, which may be dried and placed with the flowering portion. Wherever the plant is small, or of moderate size, the whole of it, including the root, should be gathered, as this will make the specimens more valuable for reference and comparison, and give a better idea of the plant. If the seeds are being shed, they should be collected and placed in a small envelope, which may be fastened on the sheet beside the plant when it is mounted. Stems which are too thick to lie flat, especially such as are woody, should be pared down at the back with a sharp knife, care being taken not to interfere with the front or exposed portion of the specimen.

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SUCCESSION OF PLANTS.

With a certain amount of care, flowers may be made to grow anywhere. In general, they do best where they have the early morning sun and are sheltered from the northeast winds. The laying out of a garden as to the selection and arrangement of flowers, shrubs, etc., must depend upon the size and surroundings. Elaborate mosaic beds and any geometrical arrangements are always to be avoided, being more mathematical than beautiful. Perhaps the most satisfactory selection of plants is, two or more varieties (according to the size of garden) of spring, summer and autumn flowers. These will give pleasure throughout the three seasons. But care should be taken to so arrange them that there will not be too prominent a gap in any bed from one season to the next. For short plants a bed neatly cut in the grass-plot, gives perhaps the prettiest effect. Raised beds are objectionable from the fact that moisture runs off from them, very quickly and washes down the edges.

SOIL.

The best soil for all flowers is a mellow loam. A sandy loose soil may be brought to a good condition by a dressing of clay and well-rotted manure. A clayey soil should be treated in the same way, substituting sand for clay. In either case the dressing should be well spaded in.

MANURING AND DRAINING.

Every garden should be well manured in the autumn, and the manure worked in in the spring. If the natural drainage is not good, artificial drains should be dug, as no garden can do well that remains long wet after it has rained. When seeds are to be planted, the ground should be rubbed till it is soft and powdery. Small seed may be planted on top and a little earth dusted over them. For larger ones holes should be drilled, the seeds planted and covered. If the weather is dry, water them a little at night; but never plant seeds if it is wet.

POT-PLANTS.

The same soil used for gardens may be taken for pot-plants. It should always be sifted till it is very light, and a good portion of mold from the woods added. The soil should be removed every year after the plants have finished blossoming, and fresh soil given. In re-potting leave a little earth around the roots, and handle the plant carefully. In transplanting leave the earth around the roots, and place in holes made in the earth a little lower than it was before, water, and cover with a flower-pot or piece of paper for a day or two.

WATERING.

There is a diversity of opinion about the watering of garden-plants, but we firmly believe that a thorough watering every few days is of great benefit, particularly in the hottest months of the summer.

PLANT-LICE.

Aphides, or plant-lice, and caterpillars are the pest of a garden, and if they are once allowed a foothold will have to be diligently fought and be entirely destroyed. If a plant is sprinkled with water at night or morning and hellebore shaken over it, a good result will follow; but the surest way is to syringe with a hose, and then rake off the earth and destroy the insects.

FORCING, AND CUTTINGS.

When plants refuse to blossom, change the soil and cut off some of the roots. This forces flowers by checking the woody growth. While a plant is blossoming is the best time to take cuttings, as they are then most ready to send out roots. Never transplant at this time. Seeds should not be allowed to ripen, as they exhaust the plant. Shrubs bloom from the terminal point, and if pinched off after flowering will produce new branches next year.

WINTER TREATMENT.

Plants should never be allowed to blossom in the winter if they are to be put into the garden for summer blossoming. Nearly all woody plants and bulbs may be placed in a cellar where potatoes will not freeze, and sods laid over them grass side up. *Salvias* may be treated the same as geraniums. Plants left in the ground should be well protected with straw.

HINTS.

House-plants should only be watered enough to keep them fresh. Many do not have sufficient sunlight and air to bear much wetting. If a plant has become spindling, cut off the head, put the pot in a deep box of sand and give it plenty of sunlight.

LEADING FLOWERS.

In this article only a few points can be given. Those who wish to go more deeply into the subject should study books entirely devoted to the art. The following list indicates the particular care of a few favorite flowers.

Virginia Creeper, or Woodbine.—This vine is very pretty at all times, but more particularly in the fall, when the leaves turn to a bright red and the bunches of slate-colored berries are formed. It is most useful in any garden to cover unsightly objects and make a background for flowering plants. It may be raised from seeds or cuttings, and requires little attention.

Roses.—The treatment of roses for in-door culture is the same as for other plants: a good supply of sunlight and rich soil. Out-of-doors, they need a moist, well-manured soil, but not wet. If a compost of loam, a little sand and well-rotted cow-manure, is put on them every spring before the buds start, the branches will grow finely. The pruning of roses is very important. The old wood should be cut away, and if the bush is thrifty some of the new wood. This will cause new shoots to spring up from the roots, and the new wood produces the finest blossoms. Always cut the flower-stalks as soon as the leaves fall, for a great deal of strength goes to form the seeds. It is also good to trim off the weak shoots as soon as the plant is done flowering, so as to give the remaining branches air and light on all sides. This will cause the autumn flowers to develop more perfectly, and the summer-flowering kinds will be finer next year.

As soon as the plants have done flowering, turn the soil back from the roots and spread on a little rotted cow-manure, throw back the soil, and water occasionally if the weather is hot and

dry. Sods should never be placed around roses planted in lawns, as they prevent the air from getting to the roots, and absorb moisture. Hardy roses may be planted in October or November. Tender ones do better planted in the spring, for in the fall the roots rarely have time to get well started. Manure well and water occasionally after setting plants out.

Cuttings of roses may be started in July or August. Cut off a young shoot with some old wood. Plant in sand an inch apart, leaving three or four eyes above. The sand should be kept wet all the time; and in from two to three weeks they will be ready to transplant.

The pest of rose-culture is a slug, which appears in little white spots on the under side of the leaves. These develop into worms, which eat leaves and buds, and unless taken in season will multiply to an alarming extent. To destroy them shake powdered lime over the leaves while the dew is on. This should be done as soon as any sign or spot is noticed. The slugs first appear in May, and after the worm is grown they go into the ground and lie in a chrysalis state, but appear in August with wings, and then lay their eggs for the next season. It is therefore a good plan to give a second sprinkling of powder to thoroughly eradicate them. White hellebore or any good insect-powder may be used.

Of the thousands of varieties we will give a few choice kinds.

CHINA ROSES:—*Eugène Beauharnais*, rich crimson; *Agrippina*, deep crimson; *Indica Alba*, white; *Sanguinea*, blood-red.

TEA ROSES:—*Bon Silene*, purple shaded to carmine; *Alba Rosea*, white, with rose center; *Cornelia Cook*, canary; *Devoniensis*, creamy white; *Maréchal Neil*, golden yellow, very fragrant; *Safrona*, bright buff; *White Tea*, pure white, blooms freely; *Triomphe de Luxembourg*, rose-color.

BOURBON ROSES:—*Empress Eugénie*, deep rose; *Jupiter*, dark purple; *Malmaison*, blush, large and fine; *Omar Pasha*, deep carmine.

HYBRID PERPETUALS:—*Victor Verdin*, full carmine; *Gen. Jacqueminot*, bright red, very large; *La Reine*, pure rose; *Cardinal Patrizzi*, dark, velvety crimson.

NOISETTE ROSES:—*Gloire de Dijon*, bronze yellow, with orange center; *Augusta*, pale yellow; *Lamarque*, large, pure white, very fine; *Washington*, white.

MOSS ROSES (Annual):—*English Moss*, very mossy, old variety; *Adelaide*, crimson.

MOSS ROSES (Perpetual):—*Madame Edward Ory*, deep rose; *Perpetual White*, very fine.

PRAIRIE ROSES (Hardy Climbers):—*Baltimore Belle*, nearly white; *Gem of the Prairies*, rose-crimson, very fragrant.

Geraniums.—This plant is one of the most popular of the garden, and is easy to cultivate. Plants may be obtained from a florist in every stage of growth, and these with little trouble may, by making cuttings, be multiplied to any extent. House-plants may be grown from cuttings taken in June or July and planted in small pots filled with a compost of sand and loam, with about two inches of the latter on the top. Plant the cutting half its length, and keep it very wet until it is rooted, and when the leaves appear change to a larger pot of loam mixed plentifully with manure, and by fall the plants will be in good condition to produce winter blossoms. A rich light loam is best suited to grow geraniums in the garden. Any one living in the country can readily procure this by lifting the sods in a pasture and collecting the earth under them. To aid the blossoming of the plant, dress with liquid manure twice a week through the summer.

Shrub geraniums are tender, and when placed out-of-doors should have a good supply of sunlight, and be protected from strong winds. The pots should be examined often, and any roots that have grown through the bottom cut off. It is also a good plan to re-pot a month after they are put out, and then once more in August. In doing this, remove as much earth as possible without injuring the plant. The new pot should be a little larger, and there should be a layer of earth at the bottom before the plant is placed in it. Water plentifully for a day or two. Except the shrubby kinds, geraniums are hardy and only need shelter from the frost. In dry weather they may be watered plentifully.

Old plants that are not wanted in the house for winter may be dug up before the frost comes, the young shoots and buds cut off, the earth shaken from the roots, and hung with their heads downward in a cool dry cellar. In the spring they can be put in boxes and placed in the kitchen till the leaves are started, when they are again ready for the garden.

SWEET-SCENTED GERANIUMS:—The *Rose* and the *Oak-leaved* were formerly the only kinds cultivated, but there are now many varieties. Some of these are: *Lady Plymouth*; *Graveolus*; *Odoratissimum*; *Denticulatura*.

ZONALE GERANIUMS:—These are fine in coloring and of quick growth. Good varieties are: *Christine*, rose pink; *General Grant*, dazzling scarlet; *Blue Bells*, magenta pink; *King of Roses*, scarlet shaded to magenta.

Liliputian Zonales are dwarfs. The flowers are very beautiful in color. Some of these are: *Little Gem*, vermilion, with white center; *Little Dear*, rose, spotted white; *Baby Boy*, scarlet, with white eye.

DOUBLE GERANIUMS:—The clusters of these are large, and they do not drop their leaves as the other varieties do. Good varieties are: *Gloire de Nancy*, brilliant scarlet; *Crown Prince*, bright rose; *Émile Lemoine*, cherry-carmine.

Pansy.—This plant is also called heartsease, and is a general favorite. It dies down each year, but springs up, from self-sown seeds, or from the root, each spring. It needs abundant manuring, and in fact can hardly be enriched too much. The bed should be partially shaded, and watered every day. Watering once a week, a tablespoonful of guano dissolved in a gallon of water, will improve the blossoms.

Heliotrope.—This plant blossoms plentifully from June to October, and is easily propagated by cuttings. A first year's cutting should be pruned into one stem. It is easily trained into a high bush by means of a trellis, though not often seen so. This should be done by pruning carefully to the central stem and allowing it to head out gracefully. Plant cuttings early in the spring in a rich soil. Potted heliotrope should have the same soil and be re-potted often. Some of the best varieties are: *Duc De Lavendry*, rich blue, with a dark eye; *Étoile de Marseilles*, deep violet, with white center; *Madame Farillon*, violet; *Garibaldi*, nearly white.

Mignonette.—This is a hardy plant, and a flourisher. It will sow its own seed and spring up in abundance the next season. To start a bed, sow the seed late in the autumn.

Nasturtium.—This is a showy plant, and will grow with little care in any good soil. The pods should be gathered in August for early spring planting.

Lily.—This is a large family, and contains many beautiful varieties. The most popular of these is the *Lily of the Valley*. It will grow in any shady part of the garden, and blossom profusely with little care. The bulbs should be planted in the fall. In general, lilies will bear a large amount of manure. During the winter the bulbs may be protected by a covering of coarse manure.

Salvia.—This is one of the most beautiful of the fall plants. It grows to a bush from four to five feet high, and in September and October is covered with tassels of bright scarlet or blue flowers. It may be raised from seeds, but it is better to purchase a plant from the florist. During the winter salvias may be treated like geraniums.

Chrysanthemum.—This flower no garden should be without. It is hardy, and blooms very late in the season. It grows best in a rich light soil, and a little sand added is of benefit. Cuttings may be made, in August or after blooming, from the shoots and up by the roots.

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GENERAL REMARKS ON FRUIT-GROWING.

The soil usually considered the best for growing Apple, Pear, Cherry and Plum Trees is strong loam, clayey rather than sandy. Fruits which entirely fail from disease and the attacks of insects, grown upon sandy soil, come to great perfection upon clayey loam. In gardens where the soil is not deep and rich, there should be a trench made. This helps the roots to retain their vigor through the dry summer weather. Trees may be transplanted with success. If replanting an orchard, do not plant in the same places where the old trees stood. The size of trees for transplanting varies with the kind of tree and the object of the culture. But a rule which is approved by the best authorities is, from three to seven feet high. Never be in too great a hurry to have an orchard bear. Transplanting large trees may be sometimes accomplished with success, but not often. When large trees are to be moved, they should have a trench dug around them far enough from the trunk to include a mass of earth and roots, and the roots beyond may be cut off, and the earth put back into the

trench. This should be done early in the spring of the year preceding the removal. The result will be a growth of young rootlets, which are almost certain to insure for the tree a successful start when put into its new bed. Do not plant too deep; but leave the tree at the same level, when transplanted, as before. *Mulching* after transplanting is of service. This is simply supplying a covering of barn-yard straw, which helps retain the moisture. The best times for transplanting are, early in autumn, and early in spring. Of the two, the autumn is preferable, as the plants are then in a dormant state. See that the ground is well prepared, so that the trees may retain all the strength and good qualities which originally belonged to them, and easily assimilate more in their new position.

GRAFTING.

This is the uniting of a young scion or shoot of one kind of plant to a stem or stock of another kind, so that the scion may receive nourishment from the stock. Grafting was largely practiced in ancient times, and it now forms an important part of the art of gardening. It is chiefly valuable as it perpetuates and propagates the finest

varieties of fruit-trees and grape-vines, which could not be successfully raised from the seed. It is also of great use in hastening and increasing the fruitfulness of trees, the circulation of the sap being impeded at the junction of the stock and scion as by a deep wound, and by repeated grafting gardeners often obtain fruit and flowers much sooner than would naturally be the case. Grafting is also employed to turn to account the vigor of a root of which the branches are exhausted or otherwise unproductive, and large crops of fruit may often thus be obtained in a garden much sooner than by any other means.

How to Graft.—In grafting, it is particularly to be attended to that the *alburnum*, or sap-wood, of the scion is brought into contact with that of the stock. The hard wood of the one never unites with that of the other, remaining separate and marking the place of the operation even in the oldest trees. For scions or grafts, pieces of about 6 to 8 inches long are generally taken from the shoots of the previous summer, with several buds, but portions of shoots two years old are sometimes successfully employed. The time for grafting is in spring, as soon as the sap begins to appear. The scion should, if possible, be taken from a healthy and fruitful tree, but scions from the extremities of lateral branches are more likely to become speedily fruitful than those from the uppermost branches, where growth is most vigorous. The scion should be kept for a few days before grafting, so that the stock may rather exceed it, not only in vigor, but in the progress of its spring growth; and for this purpose may be placed in the ground, in a rather dry soil, sheltered from the direct rays of the sun. Scions may be kept for some time, and easily carried to a distance, by sticking their lower end into a potato. The end should always be freshly cut off when the scion is to be used. There are various modes of grafting.

Cleft-grafting is very commonly practiced when the stock is considerably thicker than the scion. The stock being cut over, is cleft down, and the graft, cut into the shape of a wedge at its lower end by a sharp thin knife, is inserted into the cleft. This mode of grafting is particularly applicable to branches of large trees, when the introduction of a new variety of fruit, or increased fruitfulness, is sought.

Crown-grafting is used for still thicker stocks, which are cut across, and then cleft down by two clefts crossing one another at right angles, two scions being inserted close to the bark in each cleft; or no cleft at all is made, and any desired number of scions obliquely cut away on one side are simply inserted between the bark and wood of the stock, the operation in this case being deferred till the bark readily parts from the wood.

In this kind of grafting, a longitudinal slit in the bark of the stock, opposite to each graft, is advantageous.

Tongue-grafting is the mode most commonly practiced for young trees in nurseries. For this, it is necessary that the stock and the scion should be of not very different thickness. A slit or a very narrow angular incision is made in the center of the stock downwards, and a similar one in the scion upwards, both having been first cut obliquely, at corresponding angles, and the tongue thus made in the scion being inserted into the incision in the stock, they are fastened very closely and thoroughly together.

In **saddle-grafting**, the end of the stock is cut into the form of a wedge, and the scion is affixed to it, the base of the scion having been cut or slit up for the purpose.

Shoulder-grafting, used chiefly for ornamental trees, is performed by cutting obliquely and then cutting across a small part at the top of the stock, so as to form a shoulder, the scion being cut to fit it.

Peg-grafting, not now much in use, is accomplished by making the end of the scion into a peg, and boring the top of the stock to receive it.

Fastening.—Whichever of these modes of grafting is adopted, the graft must be fastened in its place by tying, for which purpose a strand of bast-matting is commonly used. The access of air is further prevented by means of clay, which has been worked up with a little chopped hay, horse or cow dung and water, and which is applied to the place of junction so as to form a ball, tapering both upward and downward. In France, a composition of 28 parts black pitch, 28 Burgundy pitch, 16 yellow wax, 14 tallow and 14 sifted ashes, is generally used instead of clay. Gutta-percha, applied in a soft state, has also been used, or even blotting-paper held fast by strips of sticking-plaster. A good wax or clay for grafting, is made of 3 parts of resin, 3 of bees-wax and 2 of tallow, applied with a brush while warm, or cooled as a plaster and carefully bound about the stem. The progress of the buds shows the union of the graft and stock, but it is not generally safe to remove the clay in less than three months; and the ligatures, although then loosened, are allowed to remain for some time longer. From some kinds of fruit-trees, fruit is often obtained in the second year after grafting.

Budding is in principle the same as grafting; and **flute-grafting** is a kind of budding in which a ring of bark is used instead of a single bud, and a stock of similar thickness having been cut over, a ring of bark is removed, and the foreign one substituted. This is commonly performed

in spring, when the bark parts readily, and is one of the surest modes of grafting.

Inarching, or grafting by approach, in which the scion is not cut off from its parent stem until it is united to the new stock, is practiced chiefly in the case of some valuable shrubs, kept in pots, in which success by the ordinary methods is very doubtful.

Action and Reaction of Scion and Stock.—An effect is produced by the stock on the scion which it nourishes analogous to that of a change of soil; much of the vigor of a strong healthy stock is also communicated to a scion taken even from an aged tree. There is, moreover, in some degree, an influence of the elaborated sap descending from the scion on the stock which supports it. An important part of the practical skill of the gardener or nurseryman consists in the selection of the proper kinds of stocks for different species and varieties of fruit-trees. The stock and scion, however, must not be of species extremely dissimilar. No credit is due to the statements of ancient authors about vines grafted on fig-trees, apples, on planes, etc., the semblance of which can only have been brought about by some delusive artifice; for all attempts at grafting fail except among plants of the same genus, or at least of the same natural family.

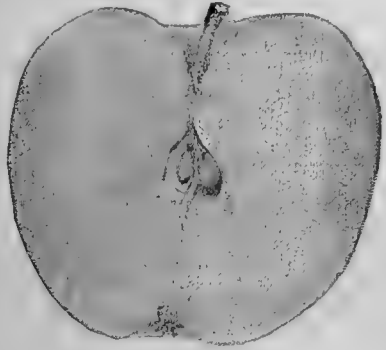
APPLES.

A selection of healthy trees should be made at a good nursery. They should be planted in rows. The distance between the rows varies with the plan of cultivation. If grass or grain is to be grown in the field, fifty feet is a safe distance apart; but if the apple-orchard is the main thought of the owner, twenty-eight or thirty feet should be allowed. Fallow crops raised in orchards greatly stimulate the growth of the trees, while grass and grain are rather a drawback. The soil about the trees should be kept free and well mellowed. If there be any sign of deterioration, the trees should have a top-dressing of manure. Trees must be treated generously in the fertilizing, and they will amply repay the grower for the extra expense. Apple-trees require little pruning if they are carefully pruned in March when they are young. All dead limbs and any which crowd should be cut away. The places where amputation has taken place should be smoothed and covered with a little liquid shellac prepared for the purpose.

Off Years.—The bearing of apples is every other year. The trees usually exhaust themselves so that they require a year in which to store up strength again to produce fruit-buds. Trees may be made to bear on each year by removing half the fruit when small. The bearing year may be changed if desired by picking off the fruit-buds as soon as they are formed.

From the almost endless varieties of apples used for the table, for cooking and for the market, we select leading ones:

American Golden Pippin.—A variety not as universally known as it should be, but superior and



AMERICAN GOLDEN PIPPIN.

profitable. The fruit is of medium size, yellow dotted with gray or russet spots.

The Baldwin is a native of Massachusetts, where it is largely raised. The tree is spreading and productive. The fruit is large, round, yellow, mostly covered with crimson stripes and orange, has a few russet marks about the stalk. The flesh is crispy and white, and the flavor high. The apple is at its best in winter, though it may be kept till spring.

The Early Harvest is one of the earliest and best liked of American apples. It is ripe about the fourth of July. The fruit is of medium size, of a

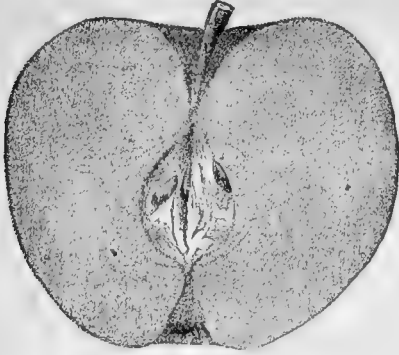


EARLY HARVEST.

handsome straw-color with a few whitish dots. The flesh is white and crispy, and the flavor fine.

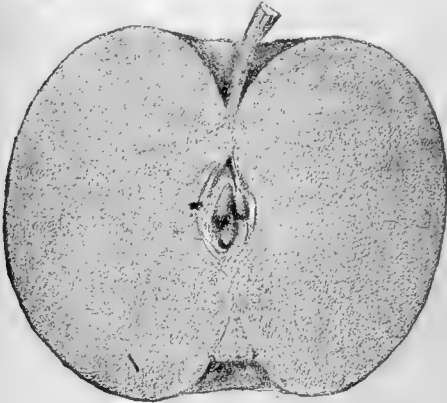
Esopus Spitzenberg.—This apple is a favorite throughout New York State, where it originated, and where it grows in great perfection. The tree has long shoots and hanging branches. The fruit is large, oblong, the color on one side is yellow with streaks of red, while the whole is red covered with yellowish-brown dots. The stalk is long and slender. The flavor is very

fine, and the flesh firm and juicy. It is a good winter apple.



ESOPUS SPITZENBERG.

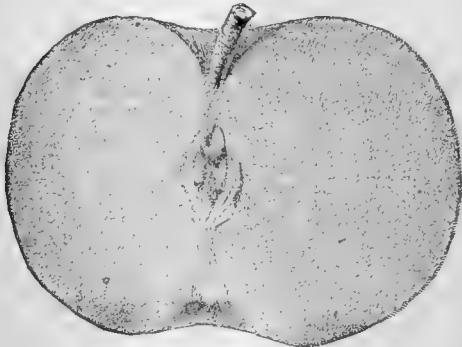
Fall Pippin.—This is the first and best of autumn apples in the Middle States. The tree is very vigorous and spreading; the fruit large, round



FALL PIPPIN.

and green, turning to yellow as it ripens. The flesh is tender, mellow and white.

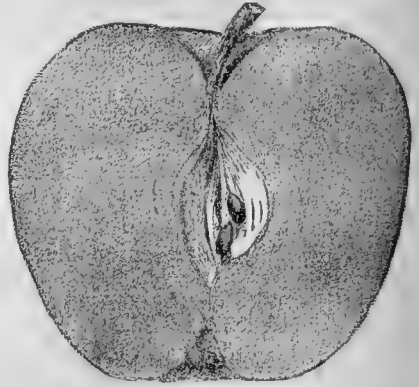
Gravenstein.—This apple is of German origin, but has attained a high place in this country. It bears early, and is very productive. The fruit



GRAVENSTEIN APPLE.

is large and a little one-sided. The skin is greenish yellow, turning to bright yellow, marbled with red and orange. The flesh is tender, crispy, high-flavored and slightly aromatic.

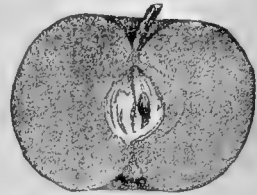
Hubbardston Nonsuch.—This is an early winter apple, very large, irregularly striped with light



HUBBARDSTON NONSUCH.

and dark red on a yellow ground. Sweetness and acidity are agreeably mingled in its flavor.

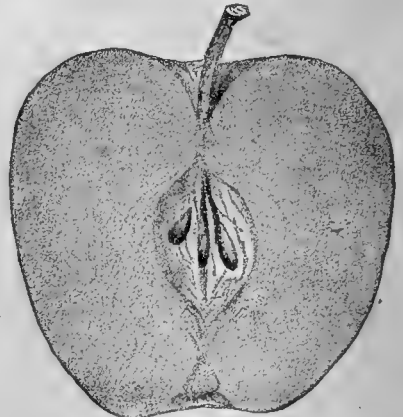
Lady-Apple.—A dainty apple for the table, and a favorite with children, bringing a high price at Christmas-time. It is a French variety of which there are a number, none of which are much



LADY-APPLE.

grown here, except the lady-apple. The fruit is very small but regular, a little flat in shape. The skin is very glossy; it has a bright red cheek upon a bright yellow ground. The flesh is crisp, very white and tender, and the flavor good.

The *Maiden's Blush* is one of the early apples,



RED ASTRACHAN.

and has much of the beauty of the lady-apple, being therefore a great favorite for table use.

The *Red Astrachan* is probably a native of Sweden, and is a fruit of great beauty. The fruit is

rather large, deep crimson, with a bit of green, and it has a fine bloom.

Yellow Newtown Pippin.—This variety and the Green Newtown Pippin are two fine varieties. The yellow pippin is rather handsomer, but the green is more juicy. They are both high-flavored, and good in late winter.

Picking and Keeping Apples.—In order to secure sound apples and have them keep well, they should be picked by hand, and when dry. For winter use, delay as long as the frost will allow you, safely. Some hold that the best method of preserving apples is to pack carefully in clean barrels, leaving them unheaded for a while in a cool, dry place, where they will not be frost-bitten. Others place the apples in open bins or on the floor, where they can be kept until dampness has disappeared, when they can be barreled and sent away to market, or kept in a dry cellar. Cellars in gravelly soil, and properly ventilated, are generally excellent places for keeping fruit and vegetables. Barrels should be laid upon their sides.

INSECTS DESTRUCTIVE TO APPLE-TREES.

The Apple-Borer.—This is a grub which enters the tree at the surface of the ground, and rapidly girdles and perforates the tender bark, soon killing the tree. The best way to kill the borer is to pick it out of the hole, or else force it far up to the end of the hole.

The Caterpillar.—Caterpillars come in myriads from eggs laid by moths the season before. They spin and weave, making large nests which envelop the leaves and branches, and all through their seven weeks' season they eat with voracity the young leaves. The nests should be at once removed. Never allow the caterpillars to make headway. As they are lazy and do not leave the nest before nine o'clock, the observing and alert gardener can annihilate them easily.

The Canker-Worm.—This pest has very nearly destroyed the apple-crop in New England the past few years. Where the worms have been at work the whole orchard looks as if fire had swept through it.

They come out of the ground early in spring. The females crawl slowly up the trunks, while the males, being supplied with wings, can fly. Eggs are laid in rows, and can be seen in hundreds by the careful observer. These eggs hatch in May, and the canker-worms immediately begin their ravages, entirely destroying the foliage of an orchard in a few days. To prevent the inroads of the canker-worm, the common method is to put around the trunks a piece of canvas which has been tarred. Old India-rubber melted makes a good adhesive substance, which will not

harden on exposure to the air. The female worms are by this means kept from going up the tree-trunks.

The Apple-Worm is a white grub found in apples and pears, which usually drop before they are ripe. A moth which appears in the warm evenings of June, lays eggs in the blossom end of the fruit. These eggs soon hatch, and the grub makes its way into the fruit. When it leaves the fruit it goes to the seams in the bark, and there spins a cocoon from which, the next spring, the moth comes. By keeping the bark clean and carefully searching for the cocoon, the gardener can keep free from this pest.

PEARS.

The pear-tree is not a native of America, but has been brought here from Europe. It grows wild in Europe and Asia, and reaches a great size and age. Within two hundred years it has been largely cultivated, and in the last fifty years Belgium and England have been producing choice seedlings and crosses. In our own country new seedlings are constantly appearing. The soil and climate of the Middle States are well suited to pear-growing, and very nearly coincide in these respects with Belgium, where the fruit reaches its greatest perfection. The wood is reddish, very hard, fine-grained, and is often dyed black in imitation of ebony, which it resembles.

Soil and Planting.—The soil best suited to pear-trees is a strong loam, moderately deep. Too moist a soil is unfit, as well as one too rich and heavy. The trees should be planted, thirty feet apart, in rows. They grow well in gardens, with a little pruning. Pears require less pruning than any other fruit. They may be raised from the seed.

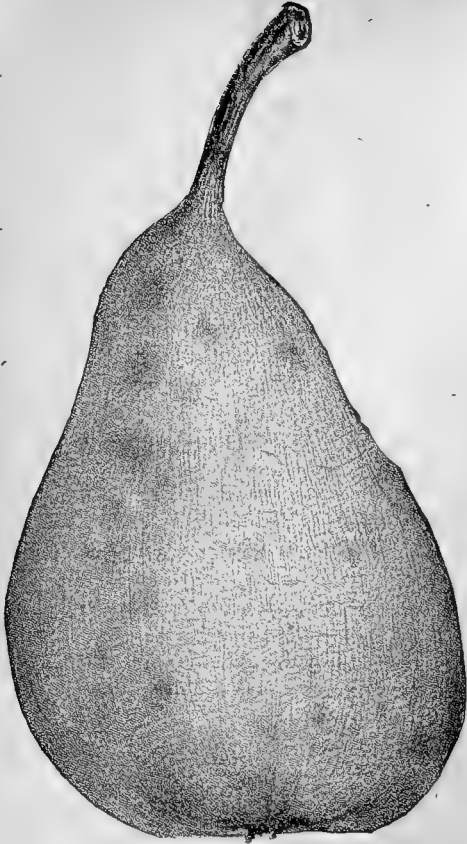
Budding or Grafting.—The budding in pear-growing is very successful, and should be done in August. Seedlings of two years' growth are in suitable condition to be budded or grafted. When grafted upon thorn-quince or mountain-ash, the size is dwarfed, and the whole strength goes into fruit-bearing.

Picking.—Pears should be picked before they are ripe. The flavor is much finer if they ripen in-doors; indeed, some pears are mealy and tasteless if left until ripe upon the trees.

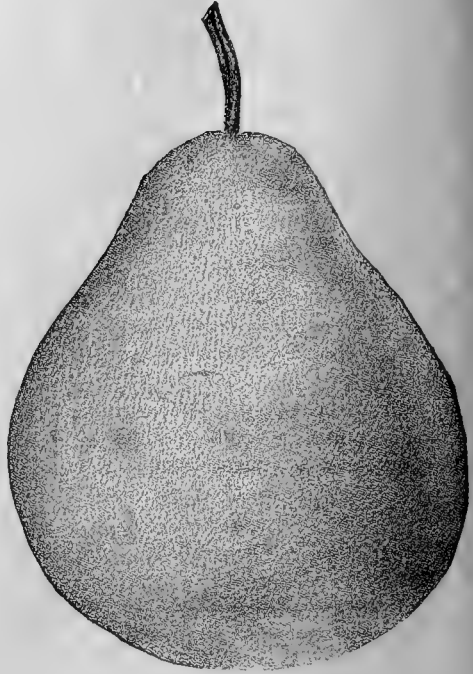
Only a few of the thousand varieties will be noticed here, and those the best for table and market.

Bartlett.—This pear should have the first mention, for it is certainly the most popular. It is far too well known to need description. It is ripe the last of August.

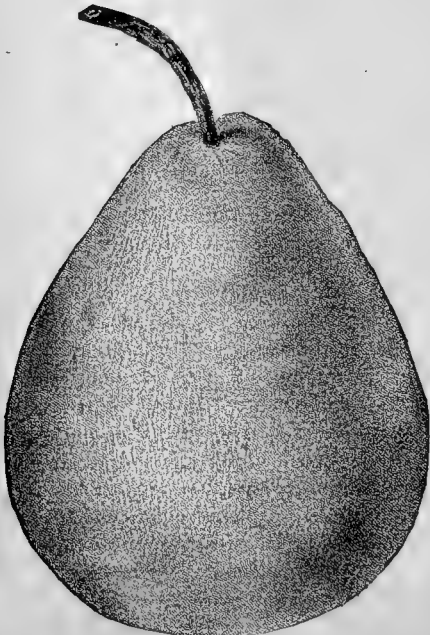
Beurre Bosc.—A handsome pear. Fruit large and pyriform, tapering to the stalk. Skin



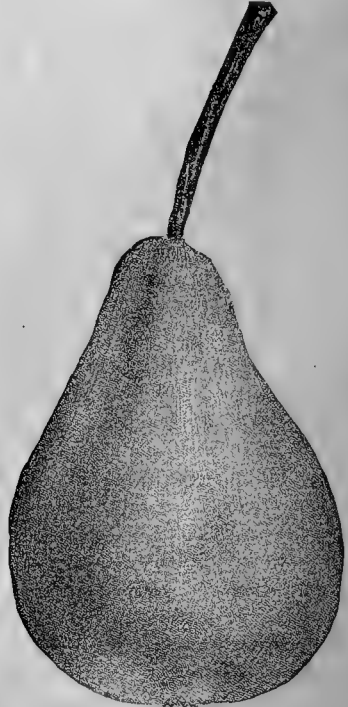
BEURRÉ BOSCH.



BEURRÉ DIEL.



FLEMISH BEAUTY.



ROSTIEZER.

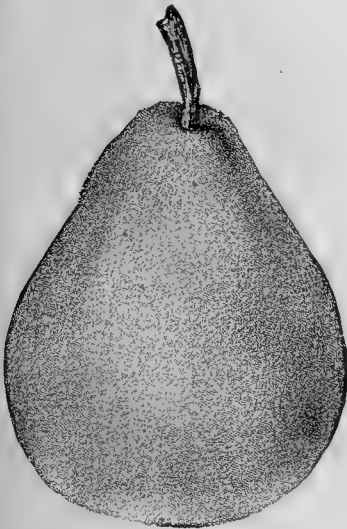
smooth, dark yellow dotted with russet, and one cheek slightly red. Flesh white, buttery, melting; the flavor rich.

Beurre Diel is a great favorite. The tree is very vigorous. Fruit large; skin thick; color from lemon to orange, marbled with russet. Flesh a little coarse, but rich and sweet. Good for eating from September to December.

Flemish Beauty.—Fruit a handsome russet when immature; surface rough and skin thick. The flavor is very high, and the flesh juicy if picked early and ripened in-doors.

Rostiezer.—A foreign variety of superior quality. The fruit is small; the flesh juicy, of pleasant perfume. Ripe by the 15th of August. One of the very best pears.

Seckel.—This is an American pear, and is placed by many pomologists at the head of the list. The tree is very hardy, of good shape. The fruit hangs in clusters at the ends of the branches, and is small and red-brown, with a spicy aroma and flavor. This pear is very juicy,



SECKEL.

and brings a good price in the market. Ripe from September 1st.

Winter Nelis.—This holds a high place as a winter pear. The fruit is medium-sized; skin yellowish green, with streaks of russet on one cheek. Flesh fine-grained, juicy, a rich aromatic flavor. Keeps well in the winter.

Diseases.—Of the enemies of the pear the *blight* is the worst, destroying whole trees without warning. It is caused by a tiny fungus. The diseased boughs must be cut away. The *bark-louse* is destructive, but with an alkaline mixture carefully used can be usually destroyed. There are many insects destructive to the leaves. The dusting of ashes, dry dust and quicklime over the leaves is sometimes beneficial.

PEACHES.

There is no country in which peach-trees grow and flourish so well as our own. In many sections they grow finely, but in Delaware, Maryland and Virginia, and the Lake Michigan region they reach perfection. The fruit is grown so easily and so rapidly, and the demand is so large, that gardeners have become careless and have neglected their orchards, and the past two or three years very inferior fruit has been offered in the Eastern market.

Soil and Exposure.—The soil which best suits the peach is a mellow loam. In regions where there is danger of spring frosts, the orchards should be planted on northern exposures. In southern aspects the blossoms get far advanced, and the frost kills them. The Southern growers enrich the soil with top-dressing and leave it, while in the North the soil is worked and mellowed much as in apple-orchards.

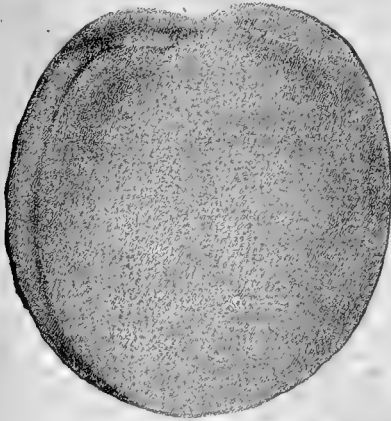
Various Hints.—Peach-stones planted in autumn will shoot up the next spring and grow rapidly, and in two years usually bear fruit. Gardeners bury peach-stones, selected with care, in the ground through the winter. In the early spring these stones are taken up, and the kernels removed and sown in well-prepared earth. Here they grow, and are ready for budding in September. Grafting is little used with the peach, as budding can be easily done. Trees are in good condition for transplanting one year from budding. The trees should be set about twenty-eight feet apart. An orchard bears regularly usually the third or fourth year. Up to the first blossoming year do not prune, but as fruit grows on the shoots of the previous year's growth, it will be well for these shoots in early spring to be cut back, at least half of them, thereby halving the quantity of the crop, but greatly improving its quality. Trees treated in this way remain symmetrical in shape, and never become deformed from the load of overweighted boughs. In this country the growing of wall-peaches is little practiced, though it might be done by those who live beyond the latitude where they do not flourish in orchards. Forcing-houses are used by a limited number.

A few varieties of the peach are here noticed, selected as the favorites, and including both cling-stone and freestone.

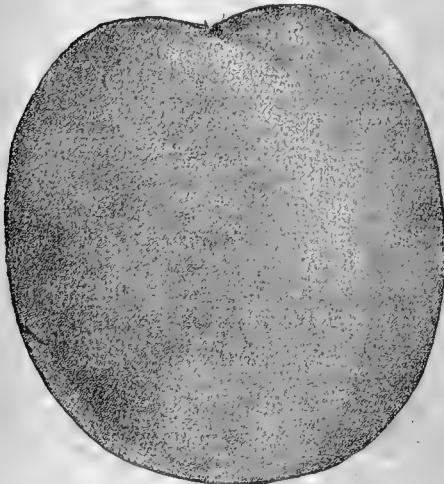
Blood Clingstone.—A large peach, much valued for preserving. The skin is very downy and dull red, while the flesh is deep red. It is a seedling which has been grown in America from the French *Sanguinole à Chair Adherente*.

Coolidge's Favorite is much grown in New England. It is a very hardy peach, handsome and of high flavor.

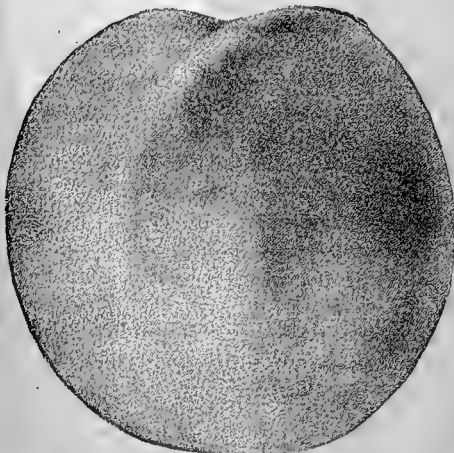
Early Crawford.—This is a yellow-fleshed peach, very early, and in great demand in market. The fruit is large, yellow-skinned, with a rosy cheek. Freestone.



BLOOD CLINGSTONE.



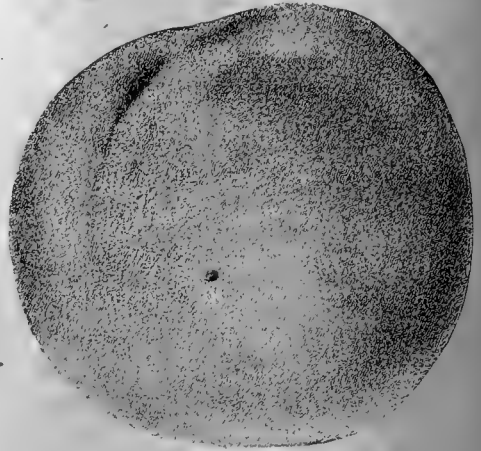
EARLY CRAWFORD.



CRAWFORD'S LATE.

Crawford's Late.—This is raised from the Melocoton, or Malacatune as it is usually called, and

is like the Early Crawford, its near relative, a very superior peach. The fruit large, yellow, with a handsome red cheek; high flavor, juicy. Freestone.



GROSSE MIGNONNE.

Grosse Mignonne.—This is a very popular peach, taking place in the first rank. The fruit is large, the skin of a pale yellow with red markings; and of a high flavor. Freestone.

Morris White Rareripe is the most popular white peach in market. The fruit is medium, the skin covered with down and white, turning to a delicate cream color when ripe; very juicy and rich.

Enemies.—The *Leaf-Curl* is a comparatively insignificant disease, hurting the appearance of the tree. The *Yellows* is probably fatal. The leaves turn yellow, the fruit drops prematurely, and the tree is apt to die. It is supposed to be the work of a very minute fungus, and the only sure plan is to cut down the affected tree, and prevent the infection of others by it. The *Peach-Borer* is a sad pest. A gum exudes where it has attacked; cut or dig it out. *Severe cold* is often fatal to peach-trees.

GRAPES.

Grapes are usually divided into two large classes, the European and the American. The European grape shown in the cut is grown in numberless varieties in different parts of the world. In France, Italy and the Rhine country grapes are grown with great success.

The growing of foreign grapes in our country has been perseveringly tried, but it does not succeed east of the Rocky Mountains except under glass.

Hot-house Culture.—There are two methods of raising grapes under glass, the first in a glass house which is not artificially heated; the other is the hot-house, where by artificial heat fruit may be forced for almost any season. As these

methods of raising are expensive and require much care we have not treated of them in this article. Neither have we spoken at length of the foreign-



Vine (*Vitis vinifera*), showing the flowers and their parts the leaves, and the fruit.

grape vineyards in California, which with the wine-making constitute there such an important industry.

American Grapes.—Along the Pacific coast the different varieties flourish well, and the yearly increasing vineyards prove the profitable growth of the vine. Of the American grapes there are usually reckoned four kinds: the northern or fox-grape, the summer grape, the frost grape, and the muscadine or southern grape. A few years ago there were only two cultivated varieties, the Catawba and Isabella. Now the number is great, and new varieties are every year brought forward by enterprising gardeners. Perhaps the most popular kinds with us are Concord, Catawba, Iona, Delaware and Norton's Virginia. This last-named, is however, only grown for wine, while the others find a ready market, where they bring much higher prices than for the purpose of wine-making.

A few words about some of the different varieties and their growth will be here given.

The Concord.—This is so well known that no description need be given. It has been raised in large quantities, but within the last few years it has rotted badly, and is not therefore considered reliable. It grows rapidly and will bear neglect. A wine of fair quality can be made from it with the use of a little artificial heat.

Catawba.—This grape is still a very great favorite, although, except in certain localities, it is very unreliable. The flavor is high, and the wine made from it fine. In the New York lake region the Catawba grows well.

Martha.—This is one of the best white grapes raised. It succeeds well in different States,

being even hardier than the Concord, of which it is a seedling. The bunches are medium-sized; berry a trifle smaller than the Concord, and has a white bloom. The pulp is soft and sweet, and if not too ripe, juicy. An excellent wine is made from it.

Wilder (Rogers' No. 4).—This is a grape good for the table and for wine. The vine is a healthy grower, and needs to have the fruit thinned out, as it bears abundantly. The bunches are large and heavy; the berries round and black, with a fine blue bloom. It ripens earlier than the Concord.

Diana is a seedling of the Catawba. This grape should be fully ripened before being picked. It is an abundant grower, and requires pruning, but not very rich soil. The bunches are large, compact, and have often a little bunch attached. The color is a lilac-red. The fruit ripens late, and will keep well during the winter.

Delaware.—This requires a rich, well-drained soil. It is very productive where it grows successfully, but it is rather delicate, and only succeeds in certain localities. The clusters are small but compact, and generally shouldered. The berry is small, red, and has a beautiful bloom upon it. It is high-flavored and sweet.

Hartford Prolific.—This, as its name indicates, is productive and hardy. It has large bunches. The berries are large and black, with a bloom, and have a perfume like wild grapes. The grapes ripen early, but drop from the bunch when fully ripe, and are therefore troublesome to market.

Iona.—This favorite, grown largely in New York State, was originated by Dr. C. W. Grant, then at Iona Island, in the Hudson, a little above Peekskill, but across the river. It produces a bunch of good size, shouldered, often double-shouldered. The berries are light red, with fine bloom; skin thin, and the flesh, tender, sweet and very juicy. It ripens about the time of the Delaware.

Black Hamburg.—This has long held the first place among black grapes for the vinery, but will rarely perfect its fruit out-of-doors. Its large size and luscious flavor have won and kept for it universal esteem. The bunches are large (about nine inches deep), and mostly with two shoulders, making it broad at the top. The berries are large, roundish and slightly inclining to oval. The skin is thickish, deep brownish purple, becoming nearly black when quite ripe, with a very sugary and rich flavor. A good and regular bearer.

Isabella.—This grape originated as did the Iona, with Dr. C. W. Grant, of Iona Island. It is vigorous, hardy and productive. The bunches are medium to large, shouldered and compact.



CONCORD.



CATAWBA.



WILDER.



DELAWARE.

The berries are large and slightly oval, with rather thin skin, and flesh tender, juicy, free from pulp and sweet. Ripens soon after Hartford Prolific.

Rebecca.—Originated in the garden of E. M. Peake, Esq., Hudson, N. Y. Vine moderately vigorous, a nice amateur grape, and succeeds well in certain localities. The bunches are medium, compact, rarely shouldered, with berries of full medium size, roundish oval, adhering strongly to the stem. Color auburn or golden in the sun and light green in the shade, covered with a light bloom. Flesh firm, juicy, sweet and delicious. Ripens with Isabella, and keeps well.

Isabella.—This grape, native of South Carolina, was brought north and introduced about 1818. Its great vigor, hardiness and productiveness, with little care, have given it a wide dissemination. Bunches of good size, five to seven inches long, rather loose, shouldered, with berries oval and quite large. Skin thick, dark purple, becoming at last nearly black, with a blue bloom. The flesh is tender, with some pulp, which nearly dissolves when fully mature; juicy, sweet, and rich, with slight musky aroma. This grape is frequently picked as soon as well colored, and long before it is ripe.

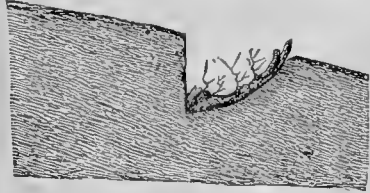
Scuppernong.—This is a very distinct Southern species, growing wild from Virginia to Florida, and climbing to the tops of the tallest trees. Unlike other grapes, its leaves are small, seldom over two or three inches in diameter, glossy and smooth on each surface. It is too tender for the Northern climate, being killed to the ground in our winters. At the South it is hardy, productive, and an excellent wine grape. The White and Black Scuppernong are hardly different except in colors, to which also the tendrils of each correspond. The bunches are small, loose, seldom composed of more than six berries, which are round and large, with skin thick, light green in the white, dark red in the black variety. Flesh quite pulpy, except when thoroughly ripe, juicy and sweet, but with a strong musky scent and flavor.

GRAPE CULTURE.

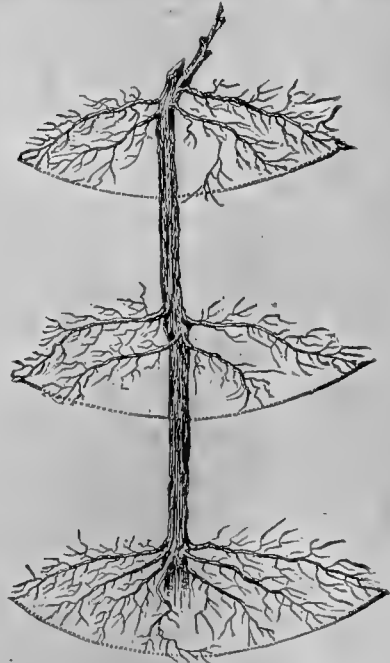
Cuttings.—Grapes may be raised either from the seeds or from cuttings and plants. The last-named method is much the best. In the autumn cuttings should be made from the old wood, and carefully put away until spring, either in a cellar or buried in the ground. In the spring the cuttings should be planted in a light sandy soil with a southern exposure. They should be planted so as to cover all the buds but one. The growth of the summer should be pruned in the autumn, leaving two branches, and those cut down to four joints. The next year two main

branches may be allowed to spring up, but the numberless side-shoots should be pinched off; and in the autumn again prune the vine as far as the eighth joint. After the second year, the only pruning needed will be that which tends to increase the fruit.

Plants.—The safest method is, however, to raise from the young plants, as the best growing



cuttings are not likely to have an even growth. Plants one year old, either from cuttings, layers or single eyes bought of a reliable nurseryman, are almost sure, with favorable location and soil, to do well. The plants should have strong well-ripened roots in abundance, also short-jointed wood well ripened. Some cultivators prefer fall planting. The ground should be marked off at suitable distances, and holes 8 or 10 inches deep



YOUNG VINE READY TO PLANT.

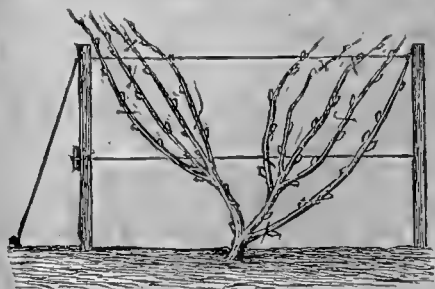
should be dug in a slanting direction. The figure shows the plant ready to be put in the ground.

Having laid the plant in and carefully fixed the roots, fill up the hole with firm earth, leaving the top bud just above the ground. In fall planting dig a ridge about each vine, that the

water may drain off. There should also be a little mulch put about the vine as a protection. Never attempt planting unless the weather be dry and the ground mellow.

For the *First Summer* there is nothing necessary but to keep the soil stirred well about the vines. If the plants are very vigorous, they should be tied to stakes. As the shoots appear they must be rubbed off, keeping only one shoot, which should have all the side or lateral shoots allowed to grow. When autumn comes, cut back the vine to two or three buds.

In the *Winter*, *Trellises* should be made, as they will be needed in the spring. Posts of cedar are excellent; they should be about six or eight feet long. Char the lower ends, then bore holes for either a three-or-two wire trellis. The holes for the posts should be dug two feet deep, and the posts should be well set. Wire size No. 12 will make a strong support. The trellises should have a brace, which can be seen below, showing a vine pruned and tied, at the end of the *Second Summer*. This method has been tried



THE VINE AT THE END OF THE SECOND SEASON.

with great success by some of the most enterprising grape-growers in the country. In the autumn of the second year, the vines should be trimmed as soon as the leaves drop.

The *Third Season*, at its beginning, should see the vines plowed and hoed, and the soil well stirred. When the shoots are young, the thumb-and-finger pruning—which is difficult for amateurs to learn, as it is the fine art of pruning—must be begun. The early pinching of the shoots throws the strength of the vine into developing the bunches, and leaves upon the shoot which remains. The bunches and leaves develop much more rapidly in consequence. If the pinching be left until after the blossoming the shoots will have become quite hard, and the plant does not thrive as well when the knife has to be used so freely. After the blooming, the laterals will start upon the bearing shoots. These should be pinched off to one or two leaves, and the leaf, as it quickly grows, serves as a conductor of sap to the bunch opposite, and also as a protection from storm and sun. The stalks

from the spurs, two or so having been left from the first pinching, as they have now grown to the length of three feet, should be pinched. These are designed as the stalks for bearing the following season, and this pinching will increase the growth of the lateral shoots. The young stalks should be tied firmly, though carefully, along the upper wire. Sometimes a fruit-branch will need a little help in holding its load; and may be tied; usually it may be allowed to hang.

The object of the fall *Pruning* and summer pruning is identical: to keep the vine within proper limits, to save its strength for bearing fine fruit, and for the growth of wood for the following year. Practice is required to know just how to treat different vines at different times, but careful observations on the nature and habits of vines will greatly assist the grower.

For the *Fourth Season* the care is much the same as for the third. A lack of vigorous growth in a vine shows that some compost, bone-ashes or woods-soil, may be needed as a tonic. Pruning in the fall is best, but can be done as late as March. Remember that sound cuttings of the last season's growth may be sold, and will, if from choice varieties, largely add to the profits of the vineyard.

Diseases of Grape-Vines.—*Mildew* is perhaps the worst. This is disastrous with the Catawba, but seldom attacks the Concord or the Martha. Close early pruning helps to prevent this fungus from destroying the crop. Sulphur dusted on the leaves and fruit will aid in destroying mildew. *Phylloxera*, or *Root-louse*, is a very great pest, attacking varieties which tend to root near the surface. There is the *gray-rot* and *spotted*, or *brown-rot*, which occasionally is very destructive. The best plan for avoiding these diseases is to try new varieties which will flourish in the same places where the old vines have become diseased.

There are some small insects which occasionally attack and prey upon the young shoots. But they can be easily kept down by syringing the parts affected with a solution of whale-oil soap.

Turkeys, ducks, and hens are most helpful in removing the multitude of insects which infest the vines, but must be kept out of the way of the ripening fruit.

To Keep in Winter.—Grapes may be preserved well into the winter, by observing the rule here given. Cut the bunches on a warm day, and lay them in a cool place for a few days. Pack the bunches in paper boxes, taking care to remove all imperfect grapes. In the bottom of each box put a layer of newspaper, then a layer of fruit, and so on until there are three layers in the boxes, not more. The boxes must be put in a dry room which is not very cold.

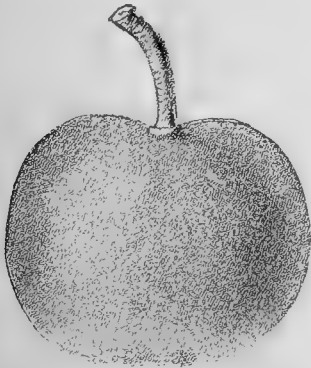
PLUMS.

There are three kinds of *wild plum* in this country, the beach plum, the red and yellow plum, and the Chickasaw plum. These are seldom if ever cultivated, but the ancestor of our fine kinds is a native of Asia and Southern Europe. The soil and climate of the Middle States are well adapted to plum-culture. The plum is certainly a very delicious fruit, but for table use it is not in such great demand as the other fruits. For cooking, canning, preserving, it is the most prized, perhaps, of all. The business of growing plums for prunes is one very important in France. A few choice varieties are raised with care, and being dried and prepared in certain ways are known as German prunes, St. Catharine Brignolles, etc.

Soil, and Fertilizing.—The plum flourishes on a heavy soil with a mixture of clay. Salt is considered good, and swamp muck, especially that from salt-water marshes, is beneficial as a fertilizer. The plum grows readily from seeds. Stones planted as soon as they are gathered will reach a height of two feet the following year. The next spring they will be suitable for planting in nursery-beds, and should under ordinary conditions be ready for working the following summer. The plum does not bud easily, so much care is required to successfully accomplish it.

Plum-trees need little *Pruning* besides thinning overcrowded trees, and old trees may be made more vigorous by "heading them in," carefully covering the wounds with shellac, and giving the roots a top-dressing.

Green Gage.—This stands first in popularity. The fruit is round and rather small; skin yel-



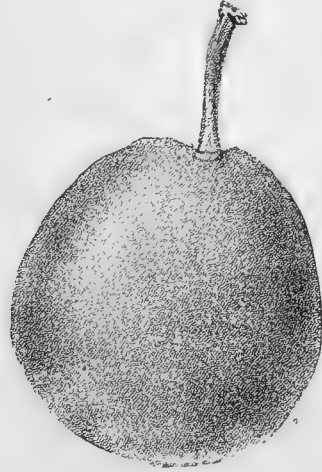
GREEN GAGE.

lowish green; flesh pale green; flavor good. Ripe in August.

Frogmore Damson.—Fruit a little larger than average; purplish black, inclining to obtuse oval in shape; flesh tender, and richly flavored. An English plum, and an enormous bearer.

Jefferson.—This is a handsome plum for the table, and something of the order of the green gage, only much larger. The skin is yellow, often with a purple-red cheek; flesh an orange color, and high-flavored.

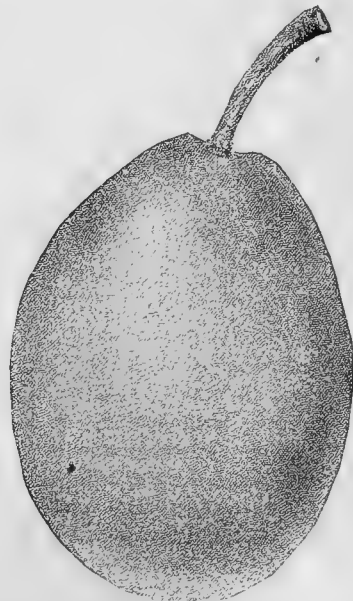
Purple Favorite.—This plum, when grown in perfection, stands in the very front rank. It is much finer than the purple gage, and grows well in the



PURPLE FAVORITE.

garden. The fruit is medium-sized, the skin is covered with a delicate blue bloom, and the color is brownish purple. The flesh is green and melting, juicy and sweet. Parts freely from the stone, which is small and roundish.

The *Egg-Plum* is widely known, though under unfavorable conditions it has not much to recom-



EGG-PLUM.

mend it for the table, but is excellent for cooking. With warm location and when left to fully

mature it is good flavored. Fruit very large; skin yellow and dotted. Ripe in August.

Diseases.—The *Black Wart* is very destructive to plum-trees. This is now considered due to a fungus, and all boughs affected should be destroyed. A beetle called the *plum-weevil*, or *curculio*, lays its eggs in the fruit, and these eggs produce a grub which feeds upon the fruit. The fruit soon drops to the ground, where the grub can get into the earth. By spreading down sheets and tapping the tree with a wooden hammer, many beetles are shaken off and can be easily killed. This several times repeated will destroy great numbers. Of course all the fallen plums should be gathered at once, or new beetles will be produced.

QUINCES.

The quince tree or bush is well known on both continents. The tree grows seldom with us higher than a bush. The blossoms are large pink and white.

The quince is unfit for eating raw, but it is in great demand for preserving. The flavor is very high even when dried. There are two kinds of quince much grown, the apple and pear-quince; the former early.

The quince requires a moist soil, well manured and will bear large fruit if so grown. Little or no pruning is required. It may be grown from seed, cuttings, or be budded. The stocks of the quince are much used for grafting or budding the pear.

Apple-shaped Quince.—The most popular variety in the country, bears large roundish, apple-shaped fruit, which stews quite tender, and is of excellent flavor. It bears most abundant crops. Leaves oval. Fruit size of a large apple, fair and smooth, and a fine golden color.

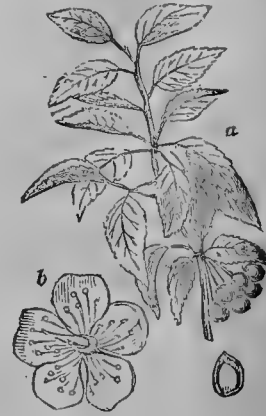
Angers.—This variety is generally used for pear stocks. It is a thrifty grower, and an abundant bearer. Much like the Apple, not quite so tender, a little more acid, and will keep longer.

Portugal Quince.—Rather superior to all others in quality, as it is less harsh, stews much better, and is altogether of a milder flavor, though not fit for eating raw. The flesh turns a fine purple or deep crimson when cooked. The leaf is larger than that of the usual quince, and the growth of the tree stronger. Fruit of the largest size, oblong ovate, obtuse. It is unfortunately a shy bearer.

Japan Quince.—This is a low thorny shrub, with small dark green leaves. In April its branches bear numerous clusters of blossoms shaped like those of the quince, but a little larger and of the brightest scarlet. Fruit dark green, very hard, and useless; and the only redemption of the plant is, that in blossoming time it becomes the most brilliant object in the shrubbery.

CHERRIES.

The cherry holds a high rank among fruits. The tree grows rapidly, except the sour or red cherry, and forms a handsome spreading tree with smooth light bark. Cherry-wood is in great demand for cabinet-making. In spring the



COMMON CHERRY (*Cerasus duracina*): a, branchlet with leaves and fruit; b, flower.

clusters of white blossoms are very beautiful, and these blooms are followed by the fruit, which hangs gracefully from long stalks. The cultivated cherry-seeds were brought to our country in the early colonial days.

A soil that is dry is best suited to the cherry, but as it is very hardy it will thrive in many different locations. The usual method of grow-



BIGARREAU.

ing cherries is from buds which are propagated on the black mazzard, which is a common variety. Cherries are grown as standards very generally in our country.

There should be but little pruning, and that little should be done in mid-summer. The peculiar gum which exudes is very similar to gum-arabic, but it is a sort of decay which takes from the strength of the tree.

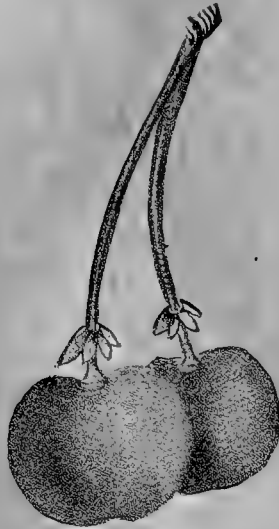
Black Mazzard.—This is a common wild cherry

beautiful of the cherries. The tree is very hardy, the fruit large and waxy in appearance, and heart-shaped. As the cherry matures, the delicate dots deepen into bright red on one cheek. The fruit is ripe the last of June.

Early Richmond, or Kentish.—This is an acid cher-



BLACK TARTAREAN.



EARLY RICHMOND.



MAYDUKE.

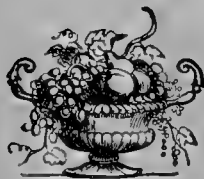
now naturalized here, of value as the stock of the Heart varieties. The fruit is small and bitter unless dead ripe.

Black Tartarean.—This is an early kind of very superior quality. The tree grows rapidly, and is vigorous. The fruit is large, heart-shaped, and of a glossy black. The flesh is deliciously rich.

Bigarreau.—This is one of the most reliable and

ry, of great value for cooking. The skin is very bright red. The fruit grows in pairs.

Mayduke.—This is a most popular early cherry, thriving in all climates. Sometimes some of the branches have clusters which ripen later than others, and so the season is very long. The fruit is round, heart-shaped; the color bright-red, which grows dark when fully ripe.



BERRIES.

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What is a Berry?—Perhaps the reader imagines that he (or she—where is that epicene pronoun?) knows what a berry is. Listen: "This term is employed in botany to designate a description of fruit more or less fleshy and juicy, and not opening when ripe. The inner layers of the pericarp are of a fleshy or succulent texture, sometimes even consisting of mere cells filled with juice, whilst the outer layers are harder, and sometimes even woody. The seeds are immersed in the pulp. A berry may be one-celled, or it may be divided into a number of cells or compartments, which, however, are united together not merely in the axis, but from the axis to the rind. It is a very common description of fruit, and is found in many different natural families, and both of exogenous and endogenous plants. As examples may be mentioned the fruits of the gooseberry, currant, vine, barberry, bilberry, belladonna, arum, bryony, and asparagus, which, although agreeing in their structure, possess widely different properties. Some of them, which are regarded as more strictly berries, have the calyx adherent to the ovary, and the placentas—from which the seeds derive their nourishment—parietal, that is, connected with the rind, as the gooseberry and currant; others, as the grape, have the ovary free, and the placentas in the center of the fruit. The orange, and other fruits of the same family, having a thick rind dotted

with numerous oil-glands, and quite distinct from the pulp of the fruit, receive the name *hesperidium*; the fruit of the pomegranate, which is very peculiar in the manner of its division into cells, is also sometimes distinguished from berries of the ordinary structure by the name *balausta*. Fruits like that of the water-lily, which at first contain a juicy pulp, and afterwards, when ripe, are filled with a dry pith, are sometimes designated *berry-capsules*. The gourds, also, which have at first three to five compartments, but when ripe generally consist of only one compartment, are distinctively designated by the term *pepo*, *peponium*, or *peponida*, to which, however, *gourd* may be considered equivalent."

Popular Signification of the Word.—The term berry is usually applied to several small fruits which are not berries in the scientific sense, as the Strawberry, which bears seeds (*achenia*) on the external surface of an enlarged and pulpy receptacle. So under the head of Berries in this book the Strawberry is put; while, per contra, under another head are placed Grapes, which although scientifically berries, will be found under Fruit. Neither grapes nor oranges partake of the ephemeral and quickly perishable nature characterizing what are in common parlance known as berries.

The cultivation of berries and small fruits has largely increased within the last few years, and in

most cases where it has been carried on judiciously in the vicinity of large markets, or at remoter points under favorable freighting arrangements, the results have generally proved successful in variety, quality and quantity. There has been a steadily increasing demand for this product, and farmers and fruit-growers who send articles of good quality, and in good condition to market, are sure to be well remunerated.

STRAWBERRIES.

What the Strawberry is.—The first place in any list of "berries" undoubtedly belongs to this old friend. Not a berry proper, it is *Fragaria*; a genus of plants of the natural order *Rosaceæ*, sub-order *Roseæ*, tribe *Potentillidæ*, remarkable for

Fragaria Virginiana, which grows wild east of the Rocky Mountains, is the ancestor of the endless varieties of this berry, the raising of which forms to-day so large an industry in many parts of the United States.

Another species, called *Fragaria Chilensis*, growing wild along the Pacific coast both in North and South America, seems to flourish better in Europe than with us. The European gardeners are seeking to perfect it, but most of the choice varieties have not succeeded when imported here.

The Virginian strawberry is most remarkable in its capacity for improvement, as all the present varieties attest.

Hovey's Seedling.—This great improvement on



the manner in which the receptacle increases and becomes succulent, so as to form what is popularly called the fruit; the proper fruit (botanically) being the small *achenia* which it bears upon its surface. The genus differs from *Potentilla* chiefly in having the receptacle succulent. The calyx is 10-cleft, the segments alternately smaller; the petals are five; the style springs from near the base of the carpel. All the species are perennial herbaceous plants, throwing out runners to form new plants; and the leaves are generally on long stalks, with three leaflets, deeply toothed. One South American species has simple leaves. In no genus are the species more uncertain to which the cultivated kinds are to be referred.

The Original Ancestor.—The common strawberry,

the original wild strawberry was introduced in 1834 by C. M. Hovey, of Cambridge, Mass., was the first precursor of a long line, and is still a very fine variety. The vines are vigorous and hardy, producing moderately large crops, and the fruit is of the largest size and finely flavored. It is well known all over the country. The leaves are large, rather light green, and the fruit-stalk long and erect. Fruit very large, roundish oval or slightly conical, deep shining scarlet. Seeds slightly imbedded. Flesh firm, with a rich, agreeable flavor. It ripens about the medium season, or slightly later.

Wilson's Albany.—About 1854, John Wilson, of Albany, N. Y., introduced this variety, which has since been more generally cultivated than any other. The vine is very hardy and vigorous,

very productive, beginning to ripen its fruit early, and continuing to the latest. Fruit large, broadly conic, pointed. Color deep crimson. Flesh crimson, tender, with a brisk acid flavor. In fact, it is too acid. Mr. Bryant, in the *Evening Post*, in 1876, gave his opinion: "Wilson's Albany is a sour, crude berry which is not fully ripe when it is red, and when perfectly ripe is too acid. When it first makes its appearance in the market it has

be banished from the market." If people do not demand a better variety, the cultivator will continue to send to market a berry which carries well, ripens early, and is most prolific.

Charles Downing.—Another variety which grows well in all parts of the country, introduced by J. S. Downer, Fairview, Ky. Plant very vigorous and very productive. Fruit very large, nearly regular, conical, deep scarlet. Seeds brown and



SETH BOYDEN STRAWBERRY.

a harsh flavor, and but little of the agreeable aroma which distinguishes the finer kinds of the berry. But the Wilson is a hardy berry; bears transportation well; is exceedingly prolific; qualities which give it great favor with the cultivator, but for which the consumer suffers. We hope that the Wilsons, as soon as their place can be supplied with a better berry, will

yellow, rather deep. Flesh quite firm, pink, juicy, sweet and rich.

Monarch of the West.—This is a very highly prized strawberry, raised by Jesse Brady, of Plano, Ill. Plant vigorous, with large, pale green leaves, moderately productive; a good variety for home use and a near market; requires high cultivation and rich soil to produce large

fruit abundantly and of good quality: should be grown in hills or narrow rows. Fruit large, sometimes very large, roundish conical, nearly regular; a few of the early berries are coxcomb-shape, and a little irregular; light scarlet; flesh light red; rather soft, juicy, sprightly, subacid, rich: quality very good.

Seth Boyden.—(Newark, N. J.) Mr. H. Jeroloman, of Hilton, N. J., writes in 1877: "My yield from one acre, planted chiefly with the Seth Boyden, was 327 bushels, 15½ quarts, which were sold for \$1,386.21. A strict account was kept. Since that time, I have been experimenting with Mr. Durand's large berries, and have not done so well. In 1878, I obtained \$1181 from one acre, one half planted with the Seth Boyden and the other with the Great American. The year of 1879 was my poorest. Nearly all my plants were Great American and Beauty, and the yield was 121 bushels, selling for \$728. The average cost per acre, for growing, picking, marketing and manure, is \$350. I am not satisfied but that I shall have to return to the old Seth Boyden in order to keep taking the first State premiums, as I have done for the past three years."

Sharpless.—This large, showy strawberry originated with J. H. Sharpless, of Catawissa, Pa.; very vigorous, with large dark green, coarsely serrated and deeply veined leaves; very productive, and is best adapted to the hill system, making large stools; it also succeeds in narrow rows. Fruit large to very large, variable in form, from irregular coxcomb-shape to roundish conical and oval; bright scarlet, somewhat glossy; flesh light red, quite firm, moderately juicy, sweet, rich and of very good flavor; medium to late in ripening. Very promising, either for market or family purposes.

Duchess.—This excellent early strawberry originated in the garden of D. H. Barnes, Poughkeepsie, N. Y. Very vigorous, foliage of medium size, dark green and healthy. Very productive; when grown in hills or narrow rows it stools and makes large plants, thus saving the labor of replanting. Fruit medium to large, roundish, obtuse-conical, regular in form, bright scarlet or crimson, flesh light red, quite firm, juicy, sprightly subacid, and of fine quality; one of the earliest to ripen, and continues a long time for an early variety; retains its size quite well to the last; is valuable for early market, and also for general use in the family. Dr. Thurber, of the *American Agriculturist*, unhesitatingly pronounced this the best of fifty varieties in one of Mr. Roe's specimen-beds.

Black Defiance.—One of the seedlings of E. W. Durand, Irvington, N. J. Plant vigorous, with dark green foliage, productive in heavy soils; requiring high culture in hills or narrow rows,

and removal of runners to obtain the fruit in quantity and perfection. Fruit large, roundish, obtuse-conical, regular; color dark crimson; flesh dark red, firm, juicy, sprightly and rich; rather early, fine for the amateur, and seems a good variety for shipment to an early market.

Triomphe de Gand.—A Belgian variety, which appears to stand our climate, and produce more crops in more localities than any other foreign sort. The vines are vigorous, hardy, moderately productive, and well suited to strong, clayey soils, requiring high cultivation, and to be grown in hills. Fruit large, roundish obtuse, sometimes coxcomb-shape, bright rich red near the calyx, almost greenish white at point, glossy as if varnished; seeds light yellow-brown, near surface; flesh firm, white, a little hollow at core, juicy, with a peculiar rich and agreeable flavor.

President Wilder.—Raised in 1860 by Hon. M. P. Wilder, of Dorchester, Mass., from seed of Hovey's Seedling, impregnated with La Constante. Plant healthy, hardy, vigorous and very productive. Fruit-stalk short, stout, erect. Stands the heat of summer and cold of winter uninjured. Fruit large to very large, roundish, obtuse-conical, very regular, bright crimson-scarlet. Seeds mostly yellow, near the surface. Flesh very white, quite firm, juicy, sweet and rich. Roe calls this "President Wilder's superb seedling."

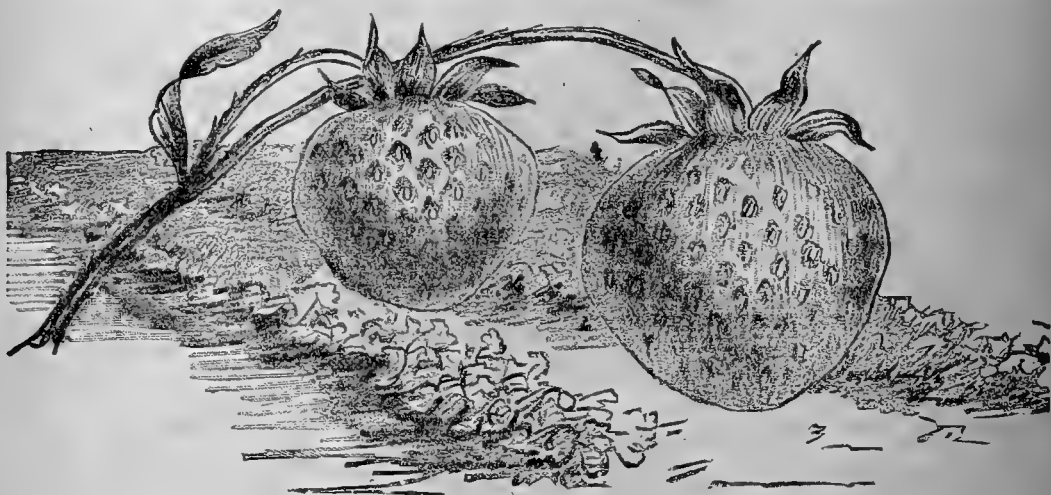
Crescent Seedling.—Originated with William Parmelee, New Haven, Conn. Hardy, strong, a vigorous grower and very productive. Leaves of medium size, dark green; requires much room to give good results; ripens early and continues late, holding its size tolerably well, and although not of high flavor, its fair size, good color and moderately firm flesh have given it a near-market value. Fruit medium to large, roundish conical, the first berries a little irregular or uneven, bright scarlet; seeds yellow and brown, near the surfaces. Requires less time and attention than most varieties, and is well calculated for those who cannot and will not give the necessary labor to produce the better kinds. Roe says it renders the laziest man in the land, who has no strawberries, without excuse. One of his beds yielded at the rate of 346 bushels to the acre.

Jucunda.—A foreign variety, that, like some others of its class, does extremely well in a few localities under high cultivation. Plant moderately vigorous. Fruit large to very large, obtuse-conical or coxcomb-flattened, bright light scarlet. Seeds mostly yellow. Flesh light pink, moderately firm, sweet, not high flavor; often hollow. So says Downing. Roe says: "The Jucunda is one of the most superb berries in existence, and can be grown with great profit in

many localities. . . . During the past summer, I had upon my wettest and stiffest land two beds of Jucunda strawberries that yielded at the rate of 190 bushels to the acre. The Jucunda strawberry is especially adapted to heavy land requiring drainage, and I think an enterprising man in the vicinity of New York might so unite them as to make a fortune."

Neuman's Prolific, or the *Charleston Berry*, is the great staple in the South, and the chief variety for shipping. "It is an aromatic berry, and very attractive as it appears in our markets in March and April, but is even harder and sourer than any unripe Wilson. When fully matured on the vine, it is grateful to those who like an acid berry. Scarcely any other kind is planted around Charleston and Savannah."—*Roe*.

Planting and Setting.—Good plants deserve and will repay careful setting and care. There is some very favorable weather in early spring, in



JUCUNDA STRAWBERRY.

which a plant is almost certain to grow even if carelessly set out, but even then it does better if properly treated. It is almost as easy to set out a plant correctly as incorrectly. Excavate a place large enough and deep enough to take in the roots, expanded fan-like, their whole length and circumference. Take the plant in one hand, and with the other half fill the hole with rich fine earth, and press it firmly against the roots; then fill it evenly, and with both hands press your weight on the soil all around the plant, till the point from which the leaves start is even with the ground. The plant must be in the ground too firm to be lifted by the leaves. *Roe* says: "If a man uses brain and eye, he can learn to work very rapidly. By one dexterous movement, he scoops the excavation with a trowel. By a second movement, he makes the earth firm against the lower half of the

roots. By a third movement, he fills the excavation and settles the plant into its final position. One workman will often plant twice as many as another, and not work any harder. Negro women at Norfolk, Va., paid at fifty cents per day, will often set two or three thousand. Many Northern laborers, who ask more than twice that sum, will not set half as many plants. I have been told of one man who could set 1000 per hour. I should examine his work carefully, however, in the fear that it was not well done."

Bad Planting.—On the opposite page are three illustrations of "how not to do it." In the first, the plant is smothered and stifled by being set too deep in the earth. In the second and third, the roots are not given the chance for life they need. All these might have been set out properly in no more time than was taken to set them out improperly.

State of the Ground.—This should be made as

nearly level as possible, and equally removed from a dry lumpy condition, and from one where the water will not readily drain off. Plant in moist, freshly stirred earth, and never when the ground is wet and sticky, unless at the beginning of what threatens to be a long storm.

Shortening Roots.—In the spring, roots should be shortened one third, which excites a rapid growth of new rootlets, and consequently of the plants. But later in the season, the plants not having such an abundance of roots, it is best not to cut them.

Freshening up Roots.—Sometimes, in a long journey, roots get black and sour, and perhaps moldy. In such case, wash them in clean tepid water, trim carefully, removing the darkened, withered ends, set out the plant, treat it with a little bone-meal, and water it. In warm weather keep the ground moist till rain comes.

Watering.—The ground should be kept moist continually, day and night. Give the plant what it needs till it is able to take care of itself. Shade it if necessary. The conditions of its healthy life are coolness, shade and moisture.

Different Methods of Cultivation.—One well-known plan is the *Matted-bed system*. The ground between the rows is cultivated and kept clean during spring and early summer. But the fast-increasing runners prevent thorough cultivation, and by winter the entire ground is covered with plants, and in that condition mulched. In the spring, the coarsest of the covering is raked off, and a path made between the rows, to be afterwards used by the pickers. Under this system the first crop is usually the best, but the land often becomes so foul that it does not pay to keep up the beds the second year. Often two crops are taken, and then some other crop alternated before going back to strawberries. This system sometimes produces fair results, but

to keep the soil mellow and open, and so moist, and the plants make great bushy crowns, covering the whole space. In the South, this seems the best system. There the plants are set in the summer and autumn, and the crop is taken from them the next spring. The plants are there set only one foot apart in the rows; and the runners can be kept down, and each separate plant stimulated to do its best.

The third plan of cultivation is the *Narrow-row system*, in which the plants are set one foot from each other in line, and in rows two and a half or three feet apart, and are not allowed to make runners. In a good soil they will touch each other, and make a continuous row, after a year's growth. Between the rows the cultivator can be carefully run, and the plants from the rows kept clear of weeds by hand and a small fork. The ground is thus occupied to the utmost profitable extent, the berries have access to air and light, and the beds can be readily mulched.



“How NOT to do it.”

is untrustworthy and slovenly. Under it the farmer has berries a few days where he should have a few weeks, and his entire crop ripens at once, perhaps in an overstocked market. It is no method for a garden, as the hoe and fork cannot be used among plants sodded together. There are some modifications of the system, but they all seem unsatisfactory and slovenly.

Another plan of cultivation is the *Hill system*. In this the plants are set out say three feet apart, and treated like hills of corn, except that the ground should be level. They are often so arranged that the cultivator can pass between them each way. But there are grave objections to this method. A great deal of ground is wasted, and the white grub has a chance to do his destructive work. The labor of mulching, where so much of the ground is unoccupied, is great. In small garden-plots this system often works well. There is opportunity to eradicate weeds,

If necessary, the ground can be easily irrigated, and the white grub extirpated.

Runners.—Each plant strives to propagate itself; but if allowed to do so, and in the degree to which it is allowed, it lessens its own vitality and power to produce berries the following season. Remove the runners, and the life of the plant is concentrated on foliage and fruit. Such a plant has abounding life, works evenly and steadily, and perfects its last berry. Rows under this system have been in bearing seven weeks. Unless plants are very strong, and set out very early, fruiting the same year is always dangerous and often fatal. If berries are wanted in a year, the plants should be set out in summer or autumn.

Mulching.—As freezing weather comes on, plants should be protected with leaves or straw, or light strawy horse-manure, sufficiently fermented to kill the grass-seeds. The plants must

not be smothered, and yet must be protected. Watch them during the winter, re-cover where washed away, and drain off all puddles. As the weather softens in early spring, begin to push back the covering, and let in air.

Spring Cultivation.—Edward P. Roe, in his interesting and instructive *Success with Small Fruits*, recommends "spring cultivation, if done properly and sufficiently early. Even where the soil has been left mellow by fall cultivation, the beating rains and the weight of melting snows pack the earth. All loamy land settles and tends to grow hard after the frost leaves it. While the mulch checks this tendency, it cannot wholly prevent it. As a matter of fact, the spaces between the rows are seldom thoroughly loosened late in the fall. The mulch too often is scattered over a comparatively hard surface, which by the following June has become so solid as to suffer disastrously from drought in a blossoming and bearing season. I have seen well-mulched fields with their plants faltering and wilting, unable to mature the crop because the ground had become so hard that an ordinary shower could make but little impression. Moreover, even if kept moist by the mulch, land long shielded from sun and air tends to become sour, heavy, and devoid of that life which gives vitality and vigor to the plant. The winter mulch need not be laboriously raked from the garden-bed field, and then carted back again. Begin on one side of a plantation and rake toward the other, until three or four rows and the spaces between them are bare; then fork the spaces or run the cultivator—often the subsoil plow—deeply through them, and then immediately, before the moist, newly made surface dries, rake the winter mulch back into its place as a summer mulch. Then take another strip and treat it in like manner, until the generous impulse of spring air and sunshine has been given to the soil of the entire plantation."

Manures.—The same author writes: "Never seek to stimulate with plaster or lime, directly. Other plants' meat is the strawberry's poison in respect to the immediate action of these two agents. Horse-manure composted with muck, vegetable mold, wood-ashes, bone-meal, and, best of all, the product of the cow-stable, if thoroughly decayed and incorporated with the soil, will probably give the largest strawberries that can be grown, if steady moisture, but not wetness, is maintained."

Origin of the Name.—Mr. Roe again: "If there were as much doubt about a crop of this fruit as concerning the origin of its name, the outlook would be dismal indeed. In old Saxon, the word was *strewberige*, or *strewberrie*; and was so named, says one authority, "from the straw-

like stems of the plant, or from the berries lying strewn upon the ground." Another authority tells us: "It is an old English practice (let us hope a modern one also) 'to lay straw between the rows to preserve the fruit from rotting on the wet ground; from which the name has been supposed to be derived; although more probably it is from the wandering habit of the plant, *straw* being a corruption of the Anglo-Saxon *stra*, from which we have the English verb *stray*.' Again, tradition asserts that in the olden times children strung the berries on straws for sale, and hence the name. Several other causes have been suggested, but I forbear. I have never known, however, a person to decline the fruit on the ground of this obscurity and doubt." Johnson's *Cyclopedia* less poetically reads, "and require in winter a covering of straw, whence the name."

RASPBERRIES.

What the Raspberry is.—*Rubus Idæus*, the most valued of all the species *Rubus*. It has pinnate leaves, with five or three leaflets, which are white and very downy beneath; stems nearly erect, downy, and covered with very numerous small weak prickles; drooping flowers, and erect whitish petals as long as the calyx. The wild raspberry has scarlet fruit. It is a low deciduous shrub, originating from the Mount Ida bramble, which appears to have reached the gardens of Southern Europe from Mount Ida. "It has a perennial root, producing biennial woody stems that reach a height of from three to six feet. The stems do not usually bear until the second year, and only that year, and are replaced by new growth from the root. The flowers are white or red, very unobtrusive, and rich in sweetness. Bees forsake all other flowers while raspberry blossoms last.

Native Red Species.—Prof. Gray thus describes this species; "*R. Strigosus*, Wild Red R. Common, especially North; from two to three feet high; the upright stems, stalks, etc., beset with copious bristles, and some of them becoming weak prickles, also glandular; leaflets oblong-ovate, pointed; cut-serrate, white downy beneath; the lateral ones (either one or two pairs) not stalked; petals as long as the sepals; fruit light red, tender and watery, but high-flavored, ripening all summer."

Red Antwerp of England.—This is the best known of the imported varieties. Canes strong and tall. Spines light red, rather numerous and pretty strong. Fruit large, nearly globular or obtuse-conical. Color dark red, with large grains, and covered with a thick bloom. Flesh juicy, with a brisk vinous flavor. Few old-fashioned gardens were without this berry, but it is giving

way to newer and more popular varieties. The fruit is too soft for market, but makes a dainty dish for home use for those who still cultivate it.

The Hudson River Antwerp is the most cultivated foreign berry in America, quite distinct from the above, though belonging to the same family. Its firmness of flesh, and parting readily from the germ, together with its productiveness, render it the most popular variety for market. Canes short, but of sturdy growth, almost spineless, of a very peculiar gray or mouse-color. Fruit large, conical. Flesh firm, rather dull red, with a slight bloom, not very juicy, but of a pleasant, sweet flavor. Said to have been brought to this country by the late Mr. Briggs, of Poughkeepsie,

The Fastolf is an English variety of high reputation. It derives its name from having originated near the ruins of an old castle, so called, in Great Yarmouth. Canes strong, rather erect, branching, light yellowish brown, with few pretty strong bristles. Fruit very large, obtuse or roundish conical, bright purplish red, rich and high-flavored, slightly adhering to the germ in picking.

Knevet's Giant.—This is one of the strongest growing varieties, very productive, and of excellent flavor. Canes strong, erect. Spines small, reddish, very few. Fruit of the largest size, obtuse-conical, deep red, firm in texture, and hangs a little to the germ in picking. Berries some-



N. Y., to whom it was given by a friend, since he was leaving the country and could not interfere with its sale in Europe. The owner had refused three guineas for a single plant. But the variety for some hidden reason has not flourished except in a small area on the Hudson River, in Milton and a little north and south of it. And now a disease called the "curl-leaf" threatens its extinction even there. In its prime the line of wagons at Marlboro landing was often nearly a mile long, and it is estimated that in a single season 1,000,000 pint baskets, about 14,700 bushels, were shipped from that landing. But now, Ichabod! its glory has departed.

times double, giving them a coxcomb appearance.

The Franconia is now the best foreign variety we have. It was introduced from Paris, more than thirty years ago. Its crops are abundant, the fruit is firm, and bears carriage to market well, and ripens about a week later than Red Antwerp. It is one of the finest for preserving. Canes strong, spreading, branching, yellowish brown, with scattered, rather stout purple spines. Leaves rather large, very deep green. Fruit large, obtuse-conical, dark purplish red, of a rich acid flavor, much more tart and brisk than that of the Red Antwerp. Its long continuance in



FRANCONIA



Belle de Fontenay.

bearing is one of its best qualities, as it lasts six weeks. It is hardy, and well adapted to high latitudes.

Belle de Fontenay.—This variety produces its fruit mainly in the autumn. Suckers freely, and requires to be carefully thinned out. The canes should all be cut down in the spring in order to obtain good crops. Canes strong, stout, branching. Spines purplish, short and stiff, quite numerous. Fruit large, long, conical. Grains large, dark crimson, thin bloom. Flesh moderately firm, juicy, sprightly; adheres slightly to the core. It is said to be entirely hardy, and to survive the winter without protection a hun-

fruit is often very large, abundant and attractive, bringing the highest prices."

But the *R. Strigosus*, our native species, is scattered almost everywhere throughout the North; growing wild by hedges and walls, in forest-glades and in the open fields. Especially where land has been cleared up and left does this berry spring up and cover acres and miles. Occasionally a bush is found whose fine fruit causes its transfer to a garden, and a new variety is thus introduced.

The Turner.—This is a hardy variety originating in the garden of Prof. J. B. Turner, Jacksonville, Fla.; it appears to succeed in more lo-



BRANDYWINE.

CUTHBERT.

dred miles north of New York. Roe says: "Its most marked characteristic is a second crop in autumn, produced on the tips of the new canes. If the canes of the previous year are cut even with the ground early in spring, the new growth gives a very abundant autumn crop of berries, which, although much inclined to crumble in picking, have still the rare flavor of a delicious fruit long out of season. It certainly is the best of the fall-bearing kinds, and deserves a place in every garden. There are more profitable market varieties, however; but if the suckers are vigorously destroyed, and the bearing canes cut well back, the

calities than any of the red varieties, and is less subject to changes in temperature; the canes, foliage and fruit possess many characteristics of the native red berry, and it suckers quite as freely; canes vigorous, light reddish on the sunny side; upright, seldom with branches; very few short, purplish spines; foliage quite large and abundant; very productive. Fruit medium or above, roundish conical, bright scarlet; grains of medium size, compact; flesh rather soft, sweet, pleasant, but not rich. A good berry for home use, but not quite firm enough for a distant market. Roe regards it as the hardiest raspberry in

cultivation, and says that a winter must be severe indeed that injures it.

The Brandywine.—This berry has been widely popular, its origin being unknown. It became the principal raspberry grown along the Brandywine Creek, and took among the marketmen the name of its chief haunt, which it still bears. Its bright color, good size and its firmness and great carrying qualities lead to its ready sale, but its dry texture and insipid flavor are against it, and it is giving place to

The Cuthbert.—This is a chance seedling, originating in the garden of the late Thomas Cuthbert, of Riverdale, N. Y. Quite hardy; a valuable market variety, and one of the best for family use; very productive; canes strong, vigorous, upright, sometimes branching; spines short, stout, purplish, rather numerous; suckers freely, rather too much so. Fruit medium to large, scarlet-crimson, roundish, obtuse-conical; grains rather small, compact, separate freely from the stalk; flesh quite firm, juicy, sweet, sprightly, having a slight flavor of the common Red, which is probably one of its parents.

Black-Caps.—This family is now numerous, of large size and good quality. Prominent are the *Gregg*, the *Mammoth Cluster*, *Sweet Home*, *Surprise*, *Elsie*, *Davidson's Thornless*, *Doolittle*, etc. The *Gregg* was found in 1866 growing wild in a ravine on the *Gregg* farm, Ohio Co., Ia. Its owners claim that it survives the coldest winters, and has never failed to produce an abundant crop. It is a vigorous, rapid grower, producing strong, well-matured canes by fall. The fruit is beautiful in appearance, and delicious, possessing excellent shipping and keeping qualities.

Soil and Culture.—The soil should be a rich deep loam, rather moist than dry. Plant the suckers or canes in rows from three to four feet apart, according to the vigor of the sort. Two or three suckers are generally planted together to form a group or *stool*, and these stools may be three feet apart in the rows, or they may be set one plant in a place, a foot or 18 inches apart in the row. The plantation, being made should receive a pruning every year, early in the spring. Examine the stools in April, and, leaving three or five of the strongest shoots or suckers to each stool, cut away the old wood and the other suckers. Cut off about a foot of the ends of the remaining shoots. After the fruit is gathered cut out the old canes which have fruited, and give the new a better chance to ripen. Top-dress lightly with manure, and keep down, or better still keep out, the weeds.

Propagation.—The raspberry is usually propagated by suckers, springing up from the main roots. It may be grown also from pieces of roots, an inch or two long, planted in a light

sandy soil in early spring, covering an inch deep, and adding a slight coat of light mulch.

Manures.—The stronger-growing raspberries, like the *Cuthbert* and the *Turner*, must not be over-fertilized. But generally they thrive on such manuring as is adapted for strawberries. Muck, sweetened by lime and frost, is capital, but any manure can be well used that is not too full of heat and ferment. The raspberry needs cool manures with staying qualities. Bone-dust, ashes, poudrette and barnyard manure can be alternated with the muck and lime, and a plantation thus treated kept in bearing nearly or quite 20 years.

BLACKBERRIES.

What they are.—Professor Gray thus describes the two leading species of this bramble:

"*Rubus Villosus*, High Blackberry. Everywhere along thickets, fence-rows, etc., and several varieties cultivated; stems one to six feet high, furrowed; prickles strong and hooked; leaflets three to five, ovate or lance-ovate, pointed, their lower surface and stalks hairy and glandular, the middle one long-stalked and sometimes heart-shaped; flowers racemed, rather large, with short bracts; fruit oblong or cylindrical.

"*R. Canadensis*, Low Blackberry or Dewberry. Rocky and sandy soil; long-trailing, slightly prickly, smooth or smoothish, and with three to seven smaller leaflets than in the foregoing; the racemes of flowers with more leaf-like bracts, the fruit of fewer grains and ripening earlier."

Downing says: The fruit is larger than that of the Raspberry, with fewer and larger grains, and a brisker flavor. It ripens about the last of July or early in August, after the former is past, and is much used by all classes in this country. There is no doubt that varieties of much larger size, and greatly superior flavor, might be produced by sowing the seeds in rich garden soil, especially if repeated for two or three successive generations. Their cultivation in gardens is similar to that of the raspberry, except that they require to be planted at greater distances apart, say from six to eight feet.

The Lawton or New Rochelle.—The first great step away from the original bramble, the wild blackberry, was taken years ago by Mr. L. A. Secor, who civilized a bush he found growing by the roadside in New Rochelle, N. Y. This variety took kindly to the garden, and has done more to introduce the fruit than all other kinds together. It is of very vigorous growth, with strong spines, is hardy and exceedingly productive. Fruit very large, oval, and, when fully ripe, intensely black. When ripe the fruit is very juicy, rather soft and tender, with a sweet, excellent

flavor; when gathered too early, it is acid and insipid. The granules are larger, consequently the fruit is less seedy than any other variety. Ripens about the first of August, and continues five or six weeks. "Ik Marvel" talks of it: "The New Rochelle or Lawton blackberry has been despitefully spoken of by many; first, because the market fruit is generally bad, being plucked before it is fully ripened; and next, because in rich, clayey grounds, the briers, unless severely cut back, grow into a tangled, unapproachable forest, with all the juices exhausted in wood. But upon a soil moderately rich, a little gravelly and warm, protected from winds, served with occasional top-dressing and good hoeing, the Lawton bears magnificent burdens.

The Kittatinny.—Despite Mr. Mitchell's eloquence the Lawton is giving way to new and better-liked varieties, prominent among which is the Kittatinny. This is a native wildling introduced by Mr. Wolverton, who found it growing in a forest near the, Kittatinny Mountains, Warren Co., N. J. It has become widely disseminated, and everywhere proves of the highest value. Canes quite hardy, and very productive; ripening early, and continuing a long time. Fruit large to very large, roundish, conical, rich glossy black, moderately firm, juicy, rich, sweet, excellent. Roe says that Mr. Wolverton, in finding it, has done more for the world than if he had discovered a gold-mine. Both this and the Lawton belong to the *R. Villosus* species.



THE KITTATINNY BLACKBERRY.

Even then, if you wish to enjoy the richness of the fruit, you must not be hasty to pluck it. When the children say, with a shout, 'The blackberries are ripe!' I know they are black only, and I can wait. When the children report, 'The birds are eating the berries!' I know I can wait. But when they say, 'The bees are on the berries!' I know they are at their ripest. Then, with baskets, we sally out; I taking the middle rank, and the children the outer spray of boughs. Even now we gather those only which drop at the touch; these, in a brimming saucer, with golden Alderney cream and a *soupeçon* of powdered sugar, are Olympian nectar; they melt before the tongue can measure their full roundness, and seem to be mere bloated bubbles of forest honey."

Wilson's Early.—This belongs to the other species, the *R. Canadensis*. Introduced by John Wilson, Burlington, N. J. A hardy, productive, very early ripening sort. Fruit large, oblong oval, black. Flesh firm, sweet, good. The fruit is earlier than the Kittatinny, and tends to ripen altogether in about ten days. Its flavor is inferior to that of the Kittatinny or Snyder, and it is too tender for the North and West.

The Snyder.—This belongs to *R. Villosus*, originating near La Porte, Ia, about 1851, and is an upright, exceedingly vigorous and stocky grower. It is too small to compete with the already described berries, yet Mr. Roe thinks "that on moist land, with judicious pruning, it could be made to approach them very nearly, however, while its earliness, hardiness, fine flavor, and



WILSON'S EARLY.



SNYDER BLACKBERRY.

ability to grow and yield abundantly almost anywhere, will lead to an increasing popularity. For home use, size is not so important as flavor and the certainty of a crop. It is also more nearly ripe when first black than any other kind

require a large spread. Bushes should not be allowed to grow over four feet high, and when there is danger of winter-killing three feet is enough, that the snow may cover and protect them.



RED DUTCH CURRANT.

that I have seen; its thorns are straight, and therefore less vicious. I find that it is growing steadily in favor; and where the Kittatiny is winter-killed, this hardy new variety leaves little cause for repining."

Soil and Culture.—The blackberry does best on light soils and in sunny exposures. The moist, heavy, partially shaded land which is best for the raspberry will send the growth of the blackberry into canes. The land should be warm and well-drained, but not dry: as on hard dry ground the fruit is liable not to mature; but to become mere collections of seeds. Deep plowing, and if possible following with the lifting-plow to loosen the subsoil, as the roots

CURRENTS.

Professor Gray thus describes "*Ribes Rubrum*, Red Currant, cultivated from Europe, also wild on our Northern border, with straggling or reclining stems, somewhat heart-shaped, three- to five-lobed leaves, the lobes roundish and drooping racemes from lateral buds distinct from the leaf-buds; edible berries red, or a white variety." The name is conjectured to be a modification of Corinth, which once exported so exclusively the small Zante grape.

Origin of our Cultivated Varieties.—These all sprang from the imported varieties mentioned above, or have been developed from wild speci-

mens found in the woods. Patience and perseverance working with nature, have done wonders.

Red Dutch.—This is an old, well-known sort, thrifty, upright growth, very productive. Fruit large, deep red, rich acid flavor, with clusters two or three inches long. Of this Mr. Roe says: "It is the currant of memory. From it was made the wine which our mothers and grandmothers felt that they could offer with perfect propriety to the minister. There are rural

much more productive than the larger varieties, and can be made to approach them so nearly in size. Indeed, not a few are annually sold for Cherry-currants."

The White Dutch.—This is precisely similar to the Red Dutch in habit, but the fruit is larger, with rather shorter bunches, of a fine yellowish-white color, with a very transparent skin. It is considerably less acid than the red, and is therefore much preferred for the table. It is also a few days earlier. Very productive.



CHERRY-CURRENT.

homes to-day in which the impression still lingers that it is a kind of temperance drink. From it is usually made the currant-jelly, without which no lady would think of keeping house in the country. In flavor the Red Dutch is unequaled by any other red currant. It is also a variety that can scarcely be killed by abuse and neglect, and it responds so generously to high culture and vigorous pruning, that it is an open question whether it cannot be made, after all, the most profitable for market, since it is so

White Grape.—An advance in size on the White Dutch. Bunches moderately long. Berries very large, whitish yellow, sweet and good. Very productive. Branches more horizontal than White Dutch, and less vigorous.

The Cherry-Currant.—This is the great market currant. A strong-growing variety, with stout, erect, short-jointed shoots. Leaves large, thick and dark green. Not any more productive than other currants, but a valuable one for market on account of its size. Fruit of the very largest

size. Bunches short. Berries deep red, and rather more acid than Red Dutch. The *Canadian Horticulturist*, September 1878, reads: "The history of this handsome currant is not without interest. Mons. Adrienne Seneclouse, a distinguished horticulturist in France, received it from Italy among a lot of other currants. He noticed the extraordinary size of the fruit, and gave it, in consequence, the name it yet bears. In the year 1843, it was fruited in the nursery of the Museum of Natural History, and figured from these samples in the *Annales de Flore et de Pomone* for February, 1848. Dr. William W. Valk, of Flushing, Long Island, N. Y., introduced it to the notice of American fruit-growers in 1846, having imported some of the plants in the spring of that year."

The Versailles, La Versaillaize, so nearly resembles the cherry currant, that the opinion is quite general that the two are nearly or quite identical. Mr. Downing finds a difference in the fact that while the Versailles strain produces many short bunches like the Cherry, it also frequently bears long tapering clusters such as are never formed on the Cherry. Mr. Roe has not been able to verify even this distinction.

The Victoria, often called *May's Victoria*, is a very excellent, rather late sort, with very long bunches of bright red fruit, and is an acquisition to this class. Berries as large as Red Dutch. Bunches rather longer, of a brighter red, growth more slow, spreading, and very productive. Will hang on the bushes some two weeks longer than most currants.

Black Currants form a distinct class, not nearly as popular here as in England. They are stronger and coarser growing plants than the red and white species, and do not demand as high culture. There are several varieties grown here, but on a limited scale: the *Bang Up*, the *Black Grape*, the *Black Naples*, the *English Black*, the *Common Black* and *Lee's Prolific*.

Choice and Preparation of Soil.—Mr. Roe says: "The secret of success in the culture of currants is suggested by the fact that nature has planted nearly every species of the *Ribes* in cold, damp, northern exposures. Throughout the woods and bogs of the Northern Hemisphere is found the scraggy, untamed, hardy stock from which has been developed the superb White Grape. Development does not eradicate constitutional traits and tendencies. Beneath all is the craving for primeval conditions of life, and the best success with the currant and gooseberry will assuredly be obtained by those who can give them a reasonable approach to the soil, climate and culture suggested by their damp, cold native haunts. The first requisite is not wetness, but abundant and continuous moisture. Soils naturally deficient in this, and

which cannot be made drought-resisting by deep plowing and cultivation, are not adapted to the currant. . . . Damp, heavy land, that is capable of deep, thorough cultivation, should be selected if possible. When such is not to be had, then, by deep plowing, subsoiling, by abundant mulch around the plants throughout the summer, and by occasional waterings in the garden, counteracting the effects of lightness and dryness of soil, skill can go far in making good nature's deficiencies.

"Next to depth of soil and moisture, the currant requires fertility. It is justly called one of the 'gross feeders,' and is not particular as to the quality of its food, so that it is abundant. I would still suggest, however, that it be fed according to its nature, with heavy composts, in which muck, leaf-mold, and the cleanings of the cow-stable, are largely present. Wood-ashes and bone-meal are also most excellent."

Planting.—Autumn is the best season for planting currants, and early spring nearly as good. There is little danger of the plants dying at any time if kept moist. The young bushes should be cut back after planting, half or two thirds. If rows are five feet apart, and the plants four feet apart in the rows, an acre will hold 2178 plants. If set at right angles five feet apart, an acre will hold 1742 plants. They ought to be set about three inches deeper than they stood in the nursery, and should have a shovel-full of compost around each young plant. Mr. Roe recommends the bush and not the tree form when currants are to be grown for market.

GOOSEBERRIES.

Description.—The gooseberry (*Grossularia*) is a sub-genus of the genus *Ribes*, to which the currant belongs, distinguished by a thorny stem, a more or less bell-shaped calyx, and flowers on one-to-three flowered stalks. The common gooseberry is a native of many parts of Europe and northern Asia, growing wild in rocky situations and in thickets, particularly in mountainous districts. The varieties produced by cultivation in England are very numerous, where, and especially in Lancaster, greater attention is paid to its cultivation than in any other part of the world. The Lancaster annual shows exhibit this fruit in its greatest perfection, and a *Gooseberry Book* is published annually at Manchester, giving a list of prize sorts, etc. More than a hundred and fifty exhibitions have been made in a single year, and the berry, which in its wild state weighs only about one quarter of an ounce, and is a half-inch in diameter, has been cultivated to a size of two inches in diameter and the weight of an ounce and a half. But the English climate, with its moisture and coolness, seems especially fitted for the growth of this fruit, and under our clear and

hot suns the best varieties of English sorts do not thrive, mildew of fruit and foliage being their steady enemy. But on the other side, as Mr. Downing writes, "we are indebted to the Lancashire weavers, who seem to have taken it up as a hobby, for nearly all the surprisingly large sorts of modern date."

Foreign Varieties.—As these cannot be depended upon to flourish here, it will be enough merely to give the names of a few leading varieties:—**RED GOOSEBERRIES:** *Boardman's British Crown, Champagne, Melling's Crown Bob*; **YELLOW GOOSEBERRIES:** *Buerdsill's Duckwing, Hill's Golden Gourd, Yellow Ball*; **GREEN GOOSEBERRIES:** *Collier's Jolly Angler, Green Walnut, Wainman's Green Ocean*; **WHITE GOOSEBERRIES:** *Crompton's Sheba Queen, Saunders'*

ductive, generally free from mildew; a desirable sort. Fruit medium or below, roundish, inclining to oval. Skin smooth, pale red. Flesh tender, sweet and very good. It improves greatly under high culture and pruning.

The bush has a slender and even weeping habit of growth, and can be propagated readily by cuttings.

Downing.—This is a seedling of the Houghton, originated by Mr. Charles Downing, of Newburgh, N. Y. An upright, vigorous growing plant; very productive. Fruit somewhat larger than the Houghton, roundish oval; whitish green, with the rib-veins distinct. Skin smooth. Flesh rather soft, juicy, very good. Excellent for family use. Mr. Roe says: "I consider this the best and most profitable variety that can be gen-



HOUGHTON'S SEEDLING.

Cheshire Lass, Taylor's Bright Venus. (These names, and many others, suggest the yearning of the weavers to find the ideal in the actual.) Seedlings of these foreign varieties have the same tendency to mildew shown by their parents.

The *Ribes Hirtellum* is described by Prof. Gray as the "commonest in our Eastern States, seldom downy, with very short thorns or none, very short peduncles, stamens and two-cleft style scarcely longer than the bell-shaped calyx; and the smooth berry is purple, small and sweet." This is the parent of the most widely known of our native varieties, first among which may be mentioned

The Houghton Seedling.—This originated with Abel Houghton, Lynn, Mass. A vigorous grower; branches rather drooping, slender, very pro-

erally grown in this country. In flavor it is excellent. I have had good success with it whenever I have given it fair culture. It does not propagate readily from cuttings, and therefore I increase it usually by layering."

Smith's Improved.—A new variety grown from the seed of the Houghton by Dr. Smith, of Vermont, and in growth of plant more upright and vigorous than its parent; the fruit is larger, and somewhat oval in form, light green, with a bloom. Flesh moderately firm, sweet and good.

Hobbs' Seedling.—A variety said to have been originated by O. J. Hobbs, of Randolph, Pa. Light pale green, roundish, slightly oval, smooth. Flesh medium firmness. A good keeper, and nearly one half larger than Houghton's.

Mountain Seedling.—Originated with the Shakers at Lebanon, N. Y. Plant a strong, straggling grower, and an abundant bearer. Fruit large, the largest of any known American sort, long, oval, dark brownish red, with long stalk. Skin smooth, thick. Flesh sweet. A good market sort.

Pale Red.—A variety of unknown origin. Bush more upright than Houghton. Slender wood. Very productive. Fruit small or medium, about the size of the Houghton; darker in color when fully ripe. Hangs a long time upon the bush. Flesh tender, sweet, very good.

Chester, or American Red, is an old variety, whose origin is unknown—probably its ancestors grew

flavor and size, and, its vitality thus reduced, it is more liable to mold. The plants should only be raised from cuttings, unless the object be to produce a new variety, which of course must be raised from seed. The *Encyclopædia of Gardening* thus describes the pains taken by Lancashire cultivators: "To effect this increased size, every stimulant is applied that their ingenuity can suggest. They not only annually manure the soil richly, but also surround the plants with trenches of manure for the extremities of the roots to strike into, and form around the stem of each plant a basin, to be mulched, or manured, or watered, as may become necessary. When a



SMITH'S IMPROVED.



DOWNING-GOOSEBERRY.

wild in the woods. Fruit not quite as large as the Houghton, when fully ripe darker than that, hangs long on the bush, and is sweet and good. Said not to mildew. Such characteristics point it out as suitable for a parent of new varieties.

Cultivation.—Like its near relative the currant, it flourishes best in cool exposures, and is the better for partial shade. A rich soil, especially one deep and moist, is equally requisite, and vigorous annual pruning is essential. It is impatient of drought, and needs a deep, strong loam. Don't put it under other trees for the sake of shade, as that deteriorates the fruit in

root has extended too far from the stem, it is uncovered, and all the strongest leaders are shortened back nearly one-half of their length, and covered with fresh, marly loam, well manured. The effect of this pruning is to increase the number of fibers and spongioles, which form rapidly on the shortened roots, and strike out in all directions among the fresh, newly stirred loam, in search of nutriment."

In large plantations, and where cultivation is given by means of the horse and plow, the system of growing in the bush form is by many considered most profitable.

CRANBERRIES.

Description.—Downing says: This is a familiar trailing shrub, growing wild in swampy, sandy meadows, and mossy bogs, and produces a round red, acid fruit. Our native species *Oxycoccus Macrocarpus*, so common in the swamps of New England, and on the borders of our inland lakes, as to form quite an article of commerce, is much the largest and finest species; the European cranberry being much smaller in its growth, and producing inferior fruit.

If Downing's description is not formal enough, take this from the *Encyclopædia Britannica*: "*O. palustris*, the common cranberry plant, is found in marshy land in northern and central Europe and North America. Its stems are wiry, creeping, and of varying length; the leaves are evergreen, dark and shining above, glaucous below, revolute at the margin, ovate, lanceolate or elliptical in shape, and not more than half an inch long; the flowers, which appear in May or June, are small and pedunculate, and have a four-lobed, rose-tinted corolla, purplish filaments, and anther-cell, forming two long tubes; the berries ripen in August and September; they are pear-shaped, and about the size of currants, are crimson in color, and often spotted, and have an acid and astringent taste."

Of the *O. Macrocarpus*, there are three varieties: the *Bell-Shaped*, which is the largest and most valued, of a very dark, bright red color. The *Cherry*, two kinds, large and small; the large one the best, of a round form, a fine dark red berry, nearly or quite equal to the Bell-shaped; and the *Bugle*, *Oval*, or *Egg-Shaped*, two kinds, large and small, not so high-colored as the Bell and Cherry—not so much prized, but still a fine variety.

Cultivation.—Although, naturally, it grows mostly in mossy, wet land, yet it may be easily cultivated in beds of peat soil, made in any rather moist situation; and if a third of old thoroughly decayed manure is added to the peat, the berries will be much larger, and of more agreeable flavor than the wild ones. A square of the size of twenty feet, planted in this way, will yield three or four bushels annually. The plants are easily procured, and are generally taken up like squares of sod or turf, and planted two or three feet apart, when they quickly cover the whole beds.

Cape Cod Culture.—The Cranberry grows freely in light soils, but the surface should be covered,

after plowing, with clean sand a depth of several inches. Eighty to a hundred bushels to the acre is an average product, and the care they require after the land is once prepared and planted, is next to nothing till they are ready to gather. Some farms in Massachusetts bear large crops, partly natural, partly cultivated. The berry grows wild in the greatest abundance on the sandy low necks near Barnstable, and an annual festival is made of the gathering of the fruit, which is done by the mass of the residents, who turn out on a day appointed by the authorities, and make a general gathering with their cranberry rakes, a certain portion of the crop belonging and delivered to the town. One man with his rake will gather about thirty bushels a day. The rake, however, is wasteful; and where cranberries are grown on private property, and picked by hand, three bushels is somewhere near the average picking of a day.

Results.—Joseph J. White, in *Cranberry Culture*, tells of a "little pond" in Burlington Co., N. J., containing twelve acres. After being planted ten years at an original cost of not exceeding \$500, he saw a patch of vigorous vines, from which the proprietor told him, he never gathered at one picking less than a bushel and a half per square rod, and sometimes they yielded two bushels. A square rod of the best vines was staked off, and the berries carefully picked. The yield was six bushels and two quarts, or at the rate of 970 bushels to the acre. Three acres of this meadow netted \$1800 in one year. Of course, this is an extreme case.

The Name is supposed to have been derived from the appearance of the bud. Just before expanding into the perfect flower, the stem, calyx and petals resemble the neck, head and bill of a crane; and so cranberry may be a shortening of craneberry.

Uses.—In addition to their value in the different forms of Cranberry Sauce, Cranberry Pie, Preserved and Canned Cranberries, and the well-known accompaniment to fowls, they are coming into use on shipboard as an anti-scorbutic, and in Europe a wine is made from them. White tells of an Englishman, who receiving a barrel of cranberries from a friend in America, acknowledged their receipt, stating that "the berries arrived safely, but they soured on the passage," leaving his American friend to infer that the uncooked fruit was served up in cream.



IN AND ABOUT THE BARN.

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Far back in History.—The origin of the horse lies far back in antiquity, and his is a familiar figure in almost all extant literature. Homer, Hesiod and Pindar tell us not only of horses, but of centaurs, half man and half horse, so that long before their time the horse must have been sufficiently conquered to the use of man to have originated the old legend. The usual chronology puts the Book of Job more than fifteen hundred years before Christ; late investigators put it nearly nine hundred years later. But the description Jahveh gives Job of the horse indicates that he must have been the same essentially then as now: "Hast thou given the horse strength? hast thou clothed his neck with thun-

der? . . . the glory of his nostrils is terrible. . . . He paweth in the valley, and rejoiceth in his strength; he goeth to meet the armed men," etc. The whole account is appropriate to the modern war-horse; and it is quite doubtful whether the naturalist, if he had the horse of Job's time, Alexander's Bucephalus, and the charger Gen. Sheridan rode to Winchester, could from any internal indications determine which was which. Undoubtedly if the best trotting-horses of each age at intervals of five hundred years could be speeded together, the date could be assigned to each. When Hi. Woodruff drove at Fashion and Union courses, the aim was a "two-forty" gait; now the flyers are hovering between "two-ten"

and "two-eleven," and will soon be shading off inside the ten. Such an animal as is now without any great difficulty to be had, deserves, and will repay, careful and intelligent treatment.

The Stable.—This is a very important part of the subject and one which is too often neglected by people who own horses and who leave their general management to stable-keepers or grooms often grossly neglectful or ignorant. Many horses die yearly from the neglect of their owners to enforce the ordinary laws of health in the stable. A site should be chosen, nearly or quite as well situated as that for the dwelling, and the stable may be, if possible, separate and distinct from the barn with advantage. Hide it if you like behind trees, but do not cut off the

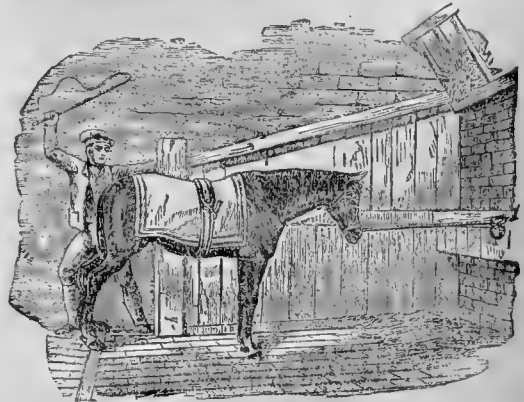
Circulation of Air.—A supply of pure air is as necessary to the life and health of a horse as of a man. In many stables air is carelessly admitted and blows either on the head of the horse or in such a way that cold and cough is the inevitable result. The practice of feeding hay through a hole above the head of the horse invites fatal results in the way of cold, not to mention the possibility of hayseed falling into the eyes of the horse when it is looking up for its food. An opposite error, however, is to exclude every possible breath of air and have the atmosphere of the stable hot and unwholesome. The effect of several horses being shut up in one stable is to render the air unpleasantly warm and foul. A person coming from the open air cannot breathe it many minutes without perspiring. In this temperature the horse stands, hour by hour, often with a covering on; this is suddenly stripped off, and it is led into the open air, the temperature of which is many degrees below that of the stable. It is true that while it is *exercising* it has no need of protection; but unfortunately it too often has to stand awaiting its master's convenience, and this perhaps after a brisk trot which has opened every pore, and its susceptibility to cold has been excited to the utmost extent. In ventilating stables it should never be forgotten that the health of a horse depends on an *abundant* supply of *fresh dry* air, introduced in such a manner as to prevent a possible chance of a *draught* on any of its inmates. Many old stables may be greatly benefited by the introduction of a window or windows which will require but little expenditure and save many dollars worth of horse-flesh.

Stalls.—Large stalls are to be preferred, and each horse should have his separate stall. Each stall should be ten feet from front to rear, and with a width of five to five and a half feet. At the foot of each stall should be a round partition post set slightly inclining, so that the bottom shall be ten feet and the top eight feet from the

head of the stall; the sides four and a half feet high, of two-inch plank; and if unruly horses are to be placed there, a couple of feet in height of woven wire cloth should be added at the top. Or, the stalls may be placed in rows each six feet wide, nine feet long, with the height above to the extent of fourteen feet. Three feet in front of the manger gives room for the feed to be brought and given, and six feet behind the stalls gives space for proper cleaning.

If the size of the stable will admit of it, loose boxes are of great benefit; and at all events there should be one loose box for cases of sickness, and this should be situated at some distance from the other stalls, to prevent the spread of any contagious disease.

Floors, and their Paving.—One good plan is to make the floor double, the upper one in three parts; the first three feet in front, of two-inch hard-wood plank, should be laid close and nailed solid; the other two sections of narrow hard-wood



THE HIND FEET ARE EASED IN THE GUTTER.

plank, to be nailed on strong end-pieces, with half-inch spaces between. These are to be hinged to other plank nine inches wide, next the sides of the stall, so as to shut together at the middle, to within half an inch of each other. Thus, all the liquid matter passes directly through to the solid and water-tight floor beneath, made of planed and grooved plank, and ending, just inside the posts, in a narrow gutter, whence it may be conveyed away to a tank.

Where there are irregularities, cleanliness is almost impossible. A good material is stone when well jointed. Cement, however, is the best when properly laid, as its elasticity is a great relief to the feet of a horse.

A slanting of the floor of the stalls should never be allowed, as it is frequently the cause of lameness and contraction of the heels. To keep the feet on a level, horses will sometimes stand out of their stalls with the hind feet over the gutter, as in the cut above.

Drainage.—The stable should be so contrived that the urine shall quickly run off, and the offensive and injurious vapor from the decomposing urine and the litter will thus be materially lessened; if, however, the urine be carried away by means of a gutter running along the stable, it must be so done as not to raise the level of the horse's hind feet above that of his forefeet. The farmer should not lose any of the urine. It is from the dung of the horse that he derives a principal and the most valuable part of his manure. It is that which earliest takes on the process of decomposition, and forms one of the strongest and most durable dressings. That which is most of all concerned with the rapidity and perfection of the process is the urine.

Litter.—Some intelligent persons have complained much of the influence of litter. If the horse stand many hours in the day with his foot embedded in straw, it is supposed that the hoof must be unnaturally heated; and it is said that the horn will contract under the influence of heat. It is seldom, however, that the foot is so surrounded by the litter that its heat will be sufficiently increased to produce this effect on the thick horn. The foot is not sufficiently long or deeply covered by the litter to produce a temperature high enough to warp the hoof. We are not the disciples of those who would, during the day, remove all litter from under the horse; we do not like the naked and uncomfortable appearance of the stable. Humanity and a proper care of the foot of the horse should induce us to keep some litter under him during the day, but his feet need not sink so deeply in it that their temperature should be much affected.

Great care should be taken that every portion of litter be removed that has been wet by urine, as decay commences very quickly and the gases given off in that state are highly injurious. In some stables piles of litter are allowed to accumulate and serve as a cloak for great uncleanness; this should never be permitted.

Light.—This neglected branch of stable-management is of far more consequence than is generally imagined. The stable is frequently destitute of any glazed window; and has only a shutter, which is raised in warm, and shut down in cold weather. When the horse is in the stable only during a few hours of the day, this is not of so much consequence; nor of so much, probably, to horses of slow work; but to carriage and road horses, so far at least as the eyes are concerned, a dark stable is little less injurious than a foul and heated one. To illustrate this, reference may be made to the unpleasant feeling and the utter impossibility of seeing distinctly, when a man suddenly emerges from a dark place into the full blaze of day. The sensation of mingled pain and

giddiness is not soon forgotten; and some time passes before the eye can accommodate itself to the increased light. If this were to happen every day, or several times in the day, the sight would be irreparably injured; or, possibly, blindness would ensue. Can we wonder, then, that the horse taken from a dark stable into a glare of light, and feeling, probably, as we should under similar circumstances, and unable, for a considerable time, to see anything around him distinctly, should become a starter, or that the frequently repeated violent effect of sudden light should induce inflammation of the eye, so intense as to terminate in blindness? There is, indeed, no doubt, in the mind of any one familiar with the subject, that horses kept in a dark stable are frequently notorious starters, and that starting has been evidently traced to this cause.

If plenty of light be admitted, the walls of the stable, and especially that portion of them which is before the horse's head, must not be of too glaring a color. The constant reflection from a white wall, and especially if the sun shines into the stable, will be as injurious to the eye as the sudden changes from darkness to light. The perpetual slight excess of stimulus will do as much mischief as the occasional but more violent one, when the animal is taken from a kind of twilight to the blaze of day. The color of the stable, therefore, should depend on the quantity of light. Where much can be admitted, the walls should be of a gray hue. Where darkness would otherwise prevail, frequent whitewashing may in some degree dissipate the gloom.

Grooming.—Of this much need not be said. The animal that is worked in all weathers needs little more than a good brushing of his legs. It is to the stabled horse, highly fed, and irregularly worked, that grooming is of so much consequence. Good rubbing with the brush opens the pores of the skin, circulates the blood and therefore produces a healthy perspiration, and stands in the room of exercise. No horse will carry a fine coat without either heat or dressing. They both effect the same purpose; they both increase the insensible perspiration; but the first does it at the expense of health and strength, while the second, at the same time that it produces a glow on the skin, and a determination of blood to it, rouses all the energies of the frame. It would be well for the proprietor of the horse if he were to insist upon it, and to see that his orders are really obeyed, that the fine coat he delights in, is produced by honest rubbing, and not by a heated stable and thick clothing. When the weather will permit the horse to be taken out, he should never be groomed in the stable. Experience teaches that if the cold is not too great, the animal is invigorated from being dressed in the

open air. There is no necessity, however, for half the punishment which many a groom inflicts upon the horse in the act of dressing; and particularly on one whose skin is thin and sensible. The currycomb should at all times be lightly applied. With many horses its use may be almost dispensed with; and even the brush need not be so hard, nor the points of the bristles so irregular as they often are. A soft brush, with a little more weight of the hand, will be equally effectual and a great deal more pleasant to the horse. A hair-cloth, while it will seldom irritate and tease, will be almost sufficient with horses that have thin hair, and that have not been neglected.

Whoever would be convinced of the benefit of friction to the horse's skin, and to the horse generally, need only observe the effect produced by well hand-rubbing the legs of a tired horse. Every enlargement subsides, the painful stiffness disappears, the legs attain their natural warmth and become fine, and the animal is evidently and rapidly reviving; he attacks his food with appetite, and then quietly lies down to rest.

Exercise.—The work of a farm-horse is usually regular and not exhausting. He is neither predisposed to disease by idleness, nor worn out by excessive exertion. He has enough to do to keep him in health, and not enough to distress or injure him; on the contrary, the regularity of his work prolongs life. For those who keep a horse for business or pleasure, the first rule we would lay down is, that every horse should have daily exercise. The horse that, with the usual stable feeding, stands idle for three or four days, as is the case in many establishments, must suffer. He is disposed to fever, or to grease, or, most of all, to diseases of the foot; and if, after these three or four days of inactivity, he is ridden fast and far, is almost sure to have inflammation of the lungs or of the feet.

A road-horse is apt to suffer a great deal more from idleness than he does from work. A stable-fed horse should have two hours' exercise every day, if he is to be kept free from disease. And this should be moderate at the beginning and at the end. Nothing of extraordinary or even of ordinary labor can be effected on the road or in the field without sufficient and regular exercise. It is this alone which can give energy to the system, or develop the powers of any animal. How then is this exercise to be given? As much as possible by, or under the superintendence of, the owner. The exercise given by any employee is rarely to be depended upon. It is inefficient, or it is extreme. It is in many cases both irregular and injurious. It is dependent on the caprice of him who is performing a task, and who will render that task subservient to his own pleasure or purposes.

In training the horse, regular exercise is the most important of all considerations, however it may be forgotten in the usual management of the stable. The exercised horse will discharge his task, sometimes a severe one, with ease and pleasure, while the idle and neglected one will be fatigued ere half his labor be accomplished, and if he be pushed a little too far, dangerous inflammation will ensue. How often, nevertheless, does it happen, that the horse that has stood inactive in the stable three or four days, is ridden or driven thirty or forty miles in the course of a single day? This rest is often purposely given to prepare for extra exertion; to lay in a stock of strength for the performance of the task required of him; and then the owner is surprised and dissatisfied, if the animal is fairly knocked up, or possibly becomes seriously ill.

Hay.—The best kinds of hay for horses are the Timothy, sometimes called Herdsglass; Orchard grass; Red-top; and Fowl-meadow. A sweet-scented vernal grass is common in Northern and Eastern meadows, and gives the peculiar odor to new-mown hay, so universally admired. A great part of the hay sold has been pressed and baled, and in that condition cannot be easily examined; and if it could, it would even then be hard for the purchaser exactly to suit himself, supposing him to know just what is best. For very few people know how to tell a good from a bad sample of hay. And yet the characteristics of good hay are very marked, and such only should be purchased by the careful horse-owner. Clover is apt to be dusty, and not properly cured, and ought not to be fed to horses.

The Statistical Abstract of the United States for 1881, prepared under the direction of the Treasury Department, estimates that there were devoted to hay in the United States in 1880, 25,863,955 acres, producing 31,925,233 tons, valued at \$371,811,084; an average to each acre of 1.23 tons, worth \$11.65 per ton, or \$14.38 per acre. The annual average of the ten years 1871–1880, was 23,743,056 acres, producing 29,266,803 tons, valued at \$327,220,132; an average to each acre of 1.23 tons, worth \$11.18 per ton, or \$13.78 per acre.

Oats.—These with hay constitute what may be called the standard food of the horse. They should not be bought by measurement, but by weight. In Great Britain, a "prime" sample will weigh nearly or quite 50 pounds; in the United States, good oats weigh, say, 35 pounds to the bushel. A first-rate oat will give three quarters of its weight in pure grain after the chaff is removed; while a poorer oat gives a less percentage of solid nutriment. The buyer should be as careful as to the quality of the oats he buys as to the quality of his hay. A sound oat should be dry and hard; it should almost chip asunder, and

not be torn or broken into pieces by compression.

It is estimated that there were devoted to oats in the United States in 1880, 16,187,977 acres, producing 417,885,380 bushels, valued at \$150,243,655; an average to each acre of 25.8 bushels, worth 36 cents per bushel, or \$9.28 per acre. The annual average of the ten years 1871-1880, was 11,816,380 acres, producing 331,501,794 bushels, valued at \$115,385,909; an average to each acre of 28.1 bushels, worth 34.8 cents per bushel, or \$9.76 per acre.

Indian Corn.—Next to hay and oats, the most important food of the horse is corn, or maize. Corn in the ear should weigh about 70 pounds to the bushel, and shelled corn about 56. If a pair of horses require half a bushel of oats a day, they will require as an equivalent in Indian corn, half a bushel in the ear, or 28 pounds shelled. Corn in its natural state is too hard for the teeth and stomach of many horses, and is a great deal better for bruising and steaming or softening.

It is estimated that there were devoted to Indian corn in the United States in 1880, 62,317,842 acres, producing 1,717,434,543 bushels, valued at \$679,714,499; an average to each acre of 27.6 bushels, worth 39.6 cents per bushel, or \$10.91 per acre. The annual average of the ten years 1871-1880, was 46,108,418 acres, producing 1,246,804,858 bushels, valued at \$512,358,595; an average rate to each acre of 27 bushels, worth 41.1 cents per bushel, or \$11.10 per acre.

How, and How Much, to Feed.—What work has the horse to do? One kept at slow and exhausting labor should have three times a day as much clean, sound grain as he will eat, and as much clean sweet hay at night as he will consume. In hot weather the grain should be oats; in winter, half oats; half corn; with intermediate proportions in intermediate weather. For cut feed, mix with half corn and half oats, ground together, one third the bulk of bran. When the horses are fed whole grain, this mess is good two or three times a week, as a change. Farm-horses should be fed in this way: Give grass at night when you can instead of hay, but cut the grass and carry it to the manger; do not turn him out at night to pasture and make him work to get his food during the time he ought to be at rest.

Road and pleasure horses should have, in addition to the oats and hay they will eat, a sweet mash of bran once or twice a week. Don't turn them out to grass. Still, grass in May and early June, giving a few oats daily with it, is not unadvisable. Musty or dusty grain ought never to be fed to horses. It invites heaves and other disorders. Even washing and kiln-drying will not cure it.

In the stables of the Third Avenue Railroad

Company, New York, are kept about two thousand horses; and according to a very interesting paper in the *St. Nicholas*, well worth the reading of any man or boy, the daily allowance for each horse is given at twenty-seven pounds of hay, oats and corn, ground and mixed, equally divided into three meals.

When to Feed Horses.—Regularity is as essential to equine as to human animals. The stomach of a civilized horse is small, even smaller than that of his wilder ancestor. Horses that do fast and exhausting work should be fed grain four times a day; when at work late in the afternoon or evening, the last feed should be later than otherwise. Horses are as a rule more apt to undereat than to overeate; and only when an animal is gluttonous, should he be restricted in food. There ought to be an interval of an hour or more after a meal before a horse is put at work.

After Fasting.—When a horse returns home, after a long fast, it is most unwise to place the famished beast before a heaped manger. First attend to its immediate requirements. These satisfied, and the harness removed, a pail of gruel should be offered to the animal. The writer knows it is said by many grooms that their horses will not drink gruel; the author likewise is aware that most servants dislike the bother attendant on its preparation, while few understand the manner in which it should be prepared. The general plan is to stir a little oatmeal into any pail containing hot water, and to offer the mess, under the name of gruel, to the palate which long abstinence may have rendered fastidious. The horse only displays its intelligence when it rejects the potion thus rudely concocted.

Gruel for Horses.—One quart of oatmeal should be put into a two-gallon pot, which is to be gradually filled with boiling water, a little cold being first used, merely to divide the grains. The saucepan is then placed on the fire, and its contents are to be briskly stirred until the liquid has *boiled* for ten minutes. After this, it may be put where it will only just simmer, and in one hour the gruel will be ready or in shorter time, should the fire be fierce. The liquid is then poured through a sieve. The solid part is mingled, while hot, with an equal quantity of bran, and this mixture, having been closely covered, is placed in the manger half an hour after the gruel has been imbibed.

Hay Tea.—This also is refreshing for a tired horse. Fill a pail with the best of clean bright hay, and pour in as much boiling water as the pail will hold. Keep it covered and hot fifteen minutes, turn off the water into another pail, and add a little cold water, enough to make a gallon and a half or so, and when cold, feed it to the horse.

Good Mash.—Boil a couple of quarts of ground oats, a pint of flax-seed and a little salt, three hours. Add bran to bring it to a proper consistency, and a little molasses. Cover in, and feed cold.—*Another.* Moisten four quarts of bran gradually with hot water, add enough boiling water to get the proper consistency, add a sprinkle of salt, cover with a cloth, and feed cold.

Value of a Sieve.—The sieve is not, but ought to be, in every stable, and to be used freely and regularly. How much trash gets into baled hay and grain, useless and even injurious to the horse! And while the grain remains in the sieve, after the refuse has been sifted out, it is well to wash it, either by dipping, or by pouring water over and through it.

Straw and Trash.—Hay, which the animal refuses to touch when placed in the rack, is often salted and cut into chaff. Thus seasoned, and in such a shape being mixed with corn, it may be eaten. The horse is imposed upon by the salt and the oats which were mingled with the trash; but has an unwholesome substance been changed into a wholesome nutriment? It is likewise a prevailing custom to cut straw of different kinds and to throw the rubbish into the chaff-bin. The quadruped may consume this species of refuse, but such trash distends the stomach, and does not nourish the body. People who advocate cheapness may be favorable to the use of straw; but these persons should not deceive themselves, far less ought they to impose upon others, by asserting that so exhausted a material can possibly prove a supporting constituent of diet.

Bread for the Stable.—The action of heat is well known to change the nature of corn, while fermentation converts the starch of the raw seed into sugar. Might not a coarse kind of bread be made for the stable? Such a plan is common throughout Germany, where it is not unusual to see a carter feeding himself and steed off the same loaf. The groom might possibly resist such an innovation upon his rights and leisure; but a better order of dependents could be found, to whom the extra labor would merely prove a pastime.

Roots.—There are various roots which might prove very acceptable in the stable. The digestion of all such articles is promoted by the substances being cooked before they are presented. The fire extracts much of the water with which they all abound; heat also, in some measure, arrests the tendency to ferment. Why should such simple and natural food be denied to the creature which nature has sent upon this earth with an appetite fitted to consume it? There is ample room for choice; so far as experiment has hitherto tested the value of such

articles of food for horses, results have been obtained which seem to say the change should be generally adopted. A sameness of diet is known to derange the human stomach. Under such a system, the palate loses its relish, while a loathing is excited which destroys appetite. How often do grooms complain of certain animals being bad feeders! May not such disinclination for sustenance be no more than the disgust engendered by a constant absence of variety? Is there any large stable where one or more quadrupeds are not equally notorious for being ravenous feeders? The disinclination for the necessary sustenance and the morbid desire for an excess of nutriment are alike symptoms of deranged digestion.

BREEDING AND TRAINING.

Breed for what you Want.—If you propose to breed a colt or colts, and wish to do it as intelligently as your opportunities will allow, settle at the beginning what you want, whether a runner, a trotter, a roadster, or whatever it is, and act accordingly. Progeny will inherit the qualities, or the mingled qualities, of the parents, using the word, parents to include ancestry. Diseases, or a predisposition to them, are inherited among horses as certainly as among humans. So are peculiarities of form and of constitution; and it is necessary, if any definite and clear result be hoped for with reason, that sire and dam be selected with a definite aim definitely carried out. If you only wish to take your chances for a common every-day horse, breed from the best sires you can find, and try to select such characteristics as will promise the highest results when combined with those of your mare.

Don't begin at too *early* an age. A mare is capable of breeding at three or four years old. Do not commence, as some have done, at two years, before her form or her strength is sufficiently developed, and with the development of which this early breeding will materially interfere. To get excellence in the offspring, you must have the highest development in the parents; and degeneration will certainly result if immature animals are bred from. And don't keep the mare breeding when she has become too old, or has broken down. If she does little more than farm work, and is reasonably treated at that, she may continue to be bred from until she is nearly twenty; but if she has been hardly worked, and bears the marks of it, let her have been what she will in her youth, she will be likely to deceive the expectations of the breeder in her old age. People do not seem to conceive that there can be any outrage committed by breeding from the body which, through a life of service, has earned a right to rest. But many

proprietors only "throw up" the animal they intend should perpetuate its race, after strains and pains have rendered longer life a misery.

Exercise.—In the case of both the sire and the mare, the extremes of idleness and of overwork should be alike avoided. The stallion should be in the best condition for his office: should not be confined in a warm dark stable, with insufficient work, allowed to get too fat, and then be expected to impress on his progeny the good qualities he ought to transmit. And the dam, for the whole period of gestation, ought to be kept at moderate work. Idleness, high living, and too much flesh work mischief to her and her offspring, as certainly as they do to her fellow-mammals, highest in the scale of being. Perhaps the more common danger may lie in the direction of too much, not too little, exercise and insufficient food; but if the best results are to be obtained, the judicious middle course must be taken. In horses, as in the human family, perfect health involves the constant and judicious use of the muscles; and the consequent uniform and thorough vitalization of the blood; by which only can the best results be obtained from mother or offspring.

Breeding in and in.—On this subject, that is, persevering in the same breed, and selecting the best on either side, much has been said. The system of crossing requires much judgment and experience; a great deal more indeed than breeders usually possess. The bad qualities of the cross are too soon engrafted on the original stock, and once engrafted there, are not, for many generations, eradicated. The good ones of both are occasionally neutralized to a most mortifying degree. On the other hand, it is the fact, however some may deny it, that strict confinement to one breed, however valuable or perfect, produces gradual deterioration. The truth here, as in many other cases, lies in the middle; crossing should be attempted with great caution, and the most perfect of the same *breed* should be selected, but varied, by being frequently taken from different stocks.

Proper Time.—The mare comes into heat in the early part of the spring. She is said to go with foal eleven months, but there is sometimes a strange irregularity about this. Some have been known to foal five weeks earlier, while the time of others has been extended six weeks beyond the eleven months. We may, however, take eleven months as the average time. In running-horses, that are brought so early to the starting-post, and whether they are foaled early in January or late in April, rank as of the same age, it is of importance that the mare should go to cover as early as possible: in a two- or three-year-old, four months would make considerable difference in

the growth and strength; yet many of these early foals are almost worthless, because they have been deprived of that additional nutriment which nature designed for them. For other breeds, the beginning of May is the most convenient period. The mare would then foal in the early part of April, when there would begin to be sufficient food for her and her colt, without confining them to the stable.

Abortion.—From the fourth month, the mare should have a little better food. This is about the period when there is danger of abortion, or, as it is technically called, "slinking the foal;" at this time, therefore, the eye of the owner should be frequently upon her. Good feeding and moderate exercise will be the best preventives against this. The mare that has once slinked her foal is ever liable to the same accident, and therefore should never be suffered to be with other mares near the time of danger. She should be kept away from bad smells, should not be allowed to see blood or dying animals, and she should never be frightened. Keep her quiet and as contented as may be, and see that she has plenty of food and of fresh air, and due exercise.

Indications of Foaling Time.—From one to three months before the expected event, the udder begins to fill and swell, and continues increasing. Some three weeks before, a hollow begins to appear on each side the spinal extension, reaching from the haunch to the tail, and becomes more apparent as the time approaches. The udder two days before, or even less, will exude a gummy substance from the end of each teat.

Foaling.—When the time comes, the mare will not be long in labor. She should be led into a thickly littered loose box, with plenty of straw, and without interstices through which she can get her legs. As a general thing, she needs no assistance. Where a false presentation is made, or the size of the coming foal demands it, mechanical services may be needed. The foal requires nothing beyond a sheltered abode and its mother's attention. If it does not get milk enough within twenty-four hours, a little skimmed cows' milk, first boiled and then slightly sweetened, being afterward diluted with its amount of warm water, may, when sufficiently cool, be presented. The human hand is inserted in the fluid, and two fingers only allowed to protrude above the surface; these are generally seized upon, the nourishment being easily imbibed by the hungry foal. More than a single feed is seldom needed.

The Mare and Colt.—The colt should run with its mother for five or six months, when it should be weaned. The mare should from the start have plenty of grass, and enough else to keep her in condition. On weaning the colt, the mare

should be put on dry food to reduce the flow, and if necessary the milk be drawn off by hand. The mare will usually be found in heat at or within a month from the time of foaling, when, if further immediate breeding is an object, she may be put again to horse.

The Young Colt.—He should be liberally fed during the whole of his growth. Bruised oats and bran should form a considerable part of his daily provender. Money expended on the proper nourishment of the growing colt is well laid out, but he should not be rendered delicate by excess of care. He should be daily handled, partially dressed, accustomed to the halter, led about, and even tied up.

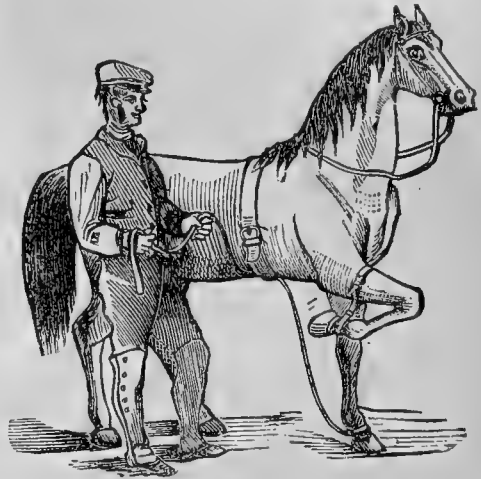
TRAINING HORSES.

Rarey's Directions.—Remember that there are certain natural laws that govern the horse. It is natural for him to kick whenever he gets badly frightened; it is natural for him to escape from whatever he thinks will do him harm. His faculties of seeing, hearing and smelling have been given him to examine everything new that he is brought into contact with. And as long as you present him with nothing that offends his eye, nose or ears, you can then handle him at will; notwithstanding he may be frightened at first, so that in a short time he will not be afraid of anything he is brought in contact with. All of the whipping and spurring of horses for shying, stumbling, etc., is useless and cruel. If he shies, and you whip him for it, it only adds terror, and makes the object larger than it would otherwise be; give him time to examine it without punishing him. He should never be hit with the whip, under any circumstances, or for anything that he does. As to smelling oil, there is nothing that assists the trainer to tame his horse better. It is better to approach a colt with the scent of honey or cinnamon upon your hand, than the scent of hogs, for horses naturally fear the scent of hogs, and will attempt to escape from it, while they like the scent of honey, cinnamon or salt. To affect a horse with drugs, you must give him some preparation of opium, and while he is under the influence of it, you cannot teach him anything more than a man when he is intoxicated with liquor. Another thing, you must remember to treat him kindly, for where you require obedience, it is better to have it rendered from a sense of love than fear.

"You should be careful not to chafe the lips of your colt or hurt his mouth in any way; if you do, he will dislike to have the bridle on. After he is taught to follow you, then put on the harness, putting your lines through the shaft-straps along the side, and teach him to yield to

the reins, turn short to the right and left, teach him to stand still before he is ever hitched up; you then have control over him. If he gets frightened, the lines should be used as a telegraph, to let him know what you want him to do. No horse is naturally vicious, but always obeys his trainer as soon as he comprehends what he would have him do; you must be firm with him at the same time, and give him to understand that you are the trainer, and that he is the horse.

"The best bits to be used to hold a horse, to keep his mouth from getting sore, is a straight bar-bit, $4\frac{1}{2}$ inches long between the rings; this operates on both sides of the jaw, while the ordinary snaffle forms a clamp and presses the side of the jaw. The curb or bridoon hurts his under jaw so that he will stop before he will give to the rein.



TO THROW A HORSE.

"To throw a horse, put a rope 12 feet long around his body in a running noose, pass it down to the right forefoot through a ring in a spencil, then buckle up the left or near forefoot, take a firm hold of your rope, lead him around until he is tired, give him a shove with your shoulder, at the same time drawing up the right foot, which brings him on his knees, hold him steady, and in a few moments he will lie down. Never attempt to hold him still, for the more he scuffles the better.

"Take your colt into a tight room or pen, and with a long whip commence snapping at his hind leg, taking care not to hit above the hocks, stopping immediately when he turns his head towards you; while his head is towards you, approach him with the left hand extended toward him, holding your whip in the right, ready to snap him as soon as he turns his head from you. In this way you can soon get your hands upon

him. As soon as you have done this, be careful to caress him for his obedience, and snap him for his disobedience. In this way he will soon learn that he is safest in your presence with his head towards you, and in a very short time you cannot keep him away from you. Speak kindly and firmly to him, all the time caressing him, calling by name, and saying, 'Ho, boy,' or 'Ho, Dan,' or some familiar word that he will soon learn.

"If a colt is awkward and careless at first, you must bear with him, remembering that we, too, were awkward when young; allowing him his own way, until by degrees he will come in. If he is willful, you must then change your course of treatment, by confining him in such a way that he is powerless for harm until he submits. If he is disposed to run, use my pole-check on him; if to kick, fasten a rope around his under jaw, pass it through the collar and attach it to his hind feet. In this way one kick will cure him, as the force of the blow falls on his jaw. If he should be stubborn, lay him down and confine him until you subdue him, without punishing him with the whip.

"Colts should be broken without blinds; after they are well broken, then you may put them on. Bridles without blinds are the best, unless you want to speed your horse: then it will be necessary to keep him from seeing the whip. Colts should be well handled and taught to give readily to the rein before they are hitched up. If you hitch them up the first thing and they become frightened, then you have no control over them; but if you teach them to start, stop and stand at the word before they are hitched, then you can govern them."

"Breaking" Horses.—The notion of "breaking" a horse is disappearing. A few years ago, the general feeling was, that a horse must be subdued, have his "will broken," and be made to understand, once for all if possible, that he must implicitly obey. Under this system, resting immediately and undisguisedly on brute force, the animal, its spirit broken, perhaps became an automaton, performing through fear what resistance could not save him from. If he tried to avoid a strange object that frightened him, the whip, the spur and equally torturing shouts were applied, and perhaps he succumbed, and perhaps he didn't. Sometimes the superior force of the animal won, he became or was regarded as vicious and tricky, and was sold from hand to hand, till a horse fit for Gen. Grant to ride or drive, sank to an omnibus or the towpath of the canal. Mr. Rarey's success in training horses brought into immediate notice a much better way, and the increasing spirit of humanity has carried forward what he was so prominent

in introducing. With horses as with men, the great majority may be trained from higher impulses than mere fear, and may be brought to a stage of coöperative confidence and helpfulness impossible where mere brute force is the sole appeal.

TRAINING THE COLT.

This process should commence from the very period of weaning. The foal should be daily handled, partially dressed, accustomed to the halter, led about, and even tied up. The tractability, good temper and value of the horse depend greatly upon this. These offices should be performed as much as possible by the man by whom the colt is fed, and whose management should be always kind and gentle. There is no fault for which a servant should be discharged so invariably or so promptly as cruelty, or even harshness, toward young stock; for the principle on which their later usefulness is founded, is early attachment to and confidence in man, and the implicit obedience resulting principally from these.

After the second winter, the work of training may begin in earnest. He may first be bitted, and with a bit smaller than usual, and that will not hurt his mouth; with this he may be allowed to amuse himself and to play, and to champ for an hour on a few successive days.

If he is destined for farm or wagon work, portions of the harness may, after he has become a little tractable, be put on him, and last of all the blinds. Let his first trial be by the side of another horse, and before an empty wagon. Give him an occasional pat or kind word; and in a little while he will learn to pull, when a load may be given him, and gradually increased.

When he begins a little to understand his business, backing, the most difficult part of his work, may be taught him; first to back well without anything behind him, then with a light cart, and afterwards with some definite load; and taking the greatest care not to seriously hurt the mouth. If the first lesson causes much soreness of the gums, the colt will not readily submit to a second. If he has been rendered tractable before by kind usage, time and patience will do all that can be wished here. Blinding him may be necessary with a restive and obstinate colt, but should be used only as a last resort.

The same principles will apply to the training of the horse for the road or the track. The handling, and some portion of instruction, should commence from the time of weaning. The future tractability of the horse will much depend on this. At two and a half or three years the regular process of training should come on.

If it be delayed until the animal is four years old, his strength and obstinacy will be more difficult to overcome. There should be much more kindness and patience, and far less harshness and cruelty, than are often exhibited, and a great deal more attention to the form and natural action of the horse. A headstall is put on the colt, and a cavesson (or apparatus to confine and pinch the nose) affixed to it, with long reins. He is first accustomed to the rein, then led round a ring on soft ground, and at length mounted and taught his paces. Next to preserving the temper and docility of the horse, there is nothing of so much importance as to teach him every pace, and every part of his duty, distinctly and thoroughly. Each must constitute a separate and sometimes long-continued lesson, and that taught by a man who will never suffer his passion to get the better of his discretion.

After the cavesson has been attached to the headstall, and the long rein put on, the first lesson is, to be quietly led about by the trainer, a steady boy following behind, by occasional threatening with the whip, but never by an actual blow, to keep the colt up. When the animal follows readily and quietly, he may be taken to the ring, and walked round, right and left, in a very small circle. Care should be taken to teach him this pace thoroughly, never suffering him to break into a trot. The boy with his whip may here again be necessary, but not a single blow should actually fall.

Becoming tolerably perfect in the walk, he should be quickened to a trot, and kept steadily at it; the whip of the boy, if needful, urging him on, and the cavesson restraining him. These lessons should be short. The pace should be kept perfect and distinct in each; and docility and improvement rewarded with frequent caresses, and handfuls of corn. The length of the rein may now be gradually increased, the pace quickened, and the time extended, until the animal becomes tractable in these his first lessons, towards the conclusion of which, crupper-straps, or something similar, may be attached to the clothing. These, playing about the sides and flanks, accustom him to the flapping of the coat of the rider. The annoyance which they occasion will pass over in a day or two; for when the animal finds that no harm comes to him on account of these straps, he will cease to regard them.

Next comes the biting. The bit should be large and smooth, and the reins should be buckled to a ring on either side of the pad. The reins should at first be slack, and very gradually tightened. This will prepare for the more perfect manner in which the head will be afterward got into a proper position, when the colt is

accustomed to the saddle. Occasionally the trainer should stand in front of the colt, take hold of each side-rein near the mouth, and press upon it, and thus begin to teach him to stop and to back at the pressure of the rein, rewarding every act of docility, and not being too eager to punish occasional carelessness or waywardness.

The colt may now be taken into the road or street to be gradually accustomed to objects among which his services will be required. Here, from fear or playfulness, a considerable degree of starting and shying may be exhibited. As little notice as possible should be taken of it. The same or similar objects should be soon passed again, but at a greater distance. If the colt still shies, let the distance be farther increased, until he takes no notice of the object; then he may gradually be brought nearer to it, and this will be usually effected without the slightest difficulty; whereas, had there been an attempt to force the animal close to it in the first instance, the remembrance of the contest would have been associated with the object, and the habit of shying would have been established.

Hitherto, with a cool and patient trainer, the whip may have been shown, but will scarcely have been used; the colt must now, however, be accustomed to this necessary instrument of authority. Let the trainer walk by the side of the animal, and throw his right arm over his back, holding the reins in his left, and occasionally quicken his pace, and, at the moment of doing this, tap the horse with the whip in his right hand, and at first very gently. The tap of the whip and the quickening of the pace will soon become associated together in the mind of the animal. If necessary, the taps may gradually fall a little heavier, and the feeling of pain be the monitor of the necessity of increased exertion. The lessons of reining-in and stopping, and backing on the pressure of the bit, may continue to be practiced at the same time.

He may now be taught to bear the saddle. Some little caution will be necessary at first putting it on. The trainer should stand at the head of the colt, patting him and engaging his attention, while an assistant on the off-side gently places the saddle on the animal's back, and another on the other side slowly tightens the girths. If he submits quietly to this, as he generally will when the previous training has been properly conducted, the operation of mounting may be attempted. The trainer will need two assistants. He will remain at the colt's head, patting and fondling him, while the rider will put his foot into the stirrup and bear a little weight on it, while the man on the off-side presses equally on the other stirrup-leather; and

according to the docility of the animal, he will gradually increase the weight until he balances himself on the stirrup. If the colt be uneasy or afraid, he should be spoken kindly to and patted, or a mouthful of corn be given him; but if he offer serious resistance, the training must terminate for that day; he may be in better humor on the morrow.

When the rider has balanced himself for a minute or two, he may gently throw his leg over, and quietly seat himself in the saddle. The trainer will then lead the animal round the ring, the rider sitting perfectly still. After a few minutes he will take the reins and handle them as gently as possible, and guide the horse by the pressure of them; patting him frequently, and especially when he thinks of dismounting, and after having dismounted offering him a little corn. The use of the rein in checking him, and of the pressure of the leg and the touch of the heel in quickening his pace, will soon be taught, and the education will be nearly completed.

The horse having thus far submitted himself to the trainer, these pittings and rewards must be gradually diminished, and implicit obedience mildly but firmly enforced. Severity will not often be necessary; in the great majority of cases it will be altogether uncalled for; but should the animal waywardly dispute the order of the trainer, he must at once be taught that he is the servant, and must obey. The education of the horse is much like that of the child. Pleasure is, as much as possible, associated with the early lessons; but firmness or, if needed, coercion must confirm the habit of obedience. Tyranny and cruelty will, more speedily in the horse than in the child, provoke the wish to disobey, and the resistance to command. The restive and vicious horse is, in ninety-nine cases out of a hundred, made so by ill-usage. None but those who will take the trouble to try the experiment are aware how absolute a command a due admixture of firmness and kindness will soon give over any horse.

The Check-Rein.—There has been great outcry made against the use of this rein, here and also in England, where it is called the bearing-rein. Mr. Bergh has denounced its use vehemently, and as President of the "Society for the Prevention of Cruelty to Animals" has tried to force its banishment. To check-rein a horse is said to be equivalent to trussing a man's head backward toward his back or heels, and compelling him, while in this position, to do duty with a loaded wheelbarrow. Mayhew says: "For the rapid motion of the head being impossible, it cannot be used to restore the disturbed balance. The nimbleness which could avoid sudden danger is destroyed by the fashionable want of feel-

ing. It is a matter for surprise that the presence of the bearing-rein is never alluded to when gentlemen seek redress because their vehicles have been damaged. Most horsemen, however, esteem the neck for its appearance, and few comprehend its utility."

And Youatt: "The angles of the lips are frequently made sore or wounded by the smallness or shortness of the snaffle, and by the unnecessary and cruel tightness of the bearing-rein. This rein not only gives the horse a grander appearance in harness, and places the head in that position in which the bit most powerfully presses upon the jaw, but there is no possibility of driving without it, unless the arm of the driver is as strong as that of Hercules; and most certainly there is no safety if it be not used. There are few horses who will not bear, or bore upon something, and it is better to let them bore upon themselves than upon the arm of the driver. Without this control, many of them would hang their heads low and be disposed every moment to stumble, and would defy all pulling, if they tried to run away. There is, and can be, no necessity, however, for using a bearing-rein so tight as to cramp the muscles of the head, which is indicated by the animal's continually tossing up his head: they may indeed be cramped to such a degree, that the horse is scarcely able to bring his head to the ground when turned to grass. The tight rein injures and excoriates the angles of the lips, and frequently brings on poll-evil. Except it be a restive or determined horse, there should be little more bearing upon the mouth than is generally used in riding. This the horse likes to feel, and it is necessary for him in the swift gallop. We must have the bearing-rein, whatever some men of humanity may say against it; but we need not use it cruelly."

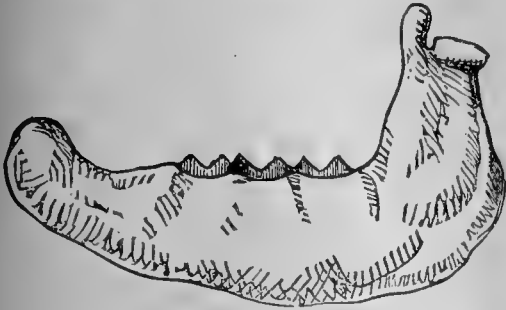
This seems to be the conclusion of common-sense. Sentimentalists may condemn and denounce the check-rein. Now and then a horse gets along without it. So "reformers" occasionally condemn and denounce the use by women of corsets or stays, and now and then a woman gets along without them. In Greece and Rome perhaps neither device was used. But here and now, in the great majority of instances, it is safer and pleasanter to use a check-rein in driving.

THE TEETH.

A foal at birth has three molars, or grinding-teeth, just through the gums, upon both sides of the upper and of the lower jaws. It generally has no incisors or front teeth; but the gums are inflamed and evidently upon the eve of bursting. The molars or grinders are, as yet, unflattened or have not been rendered smooth by attrition.

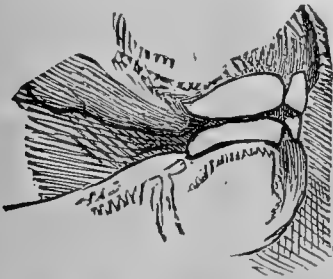
The lower jaw, when the inferior margin is felt, appears to be very thick, blunt and round.

A fortnight has rarely elapsed before the membrane ruptures, and two pairs of front, very white teeth begin to appear in the mouth. At



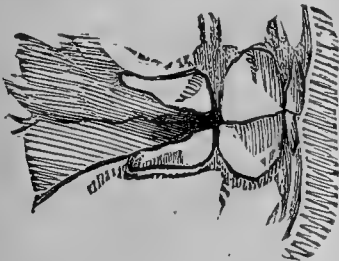
THE FOAL'S JAW AT BIRTH.

first, these new members look disproportionately large to their tiny abiding-place; and when contrasted with the reddened gums at their base, they have that pretty, pearly aspect which is the common characteristic of the milk teeth in most animals.



THE INCISORS AT TWO WEEKS OLD.

In another month, when the foal is six weeks old, more teeth appear. Much of the swelling at first present has softened down. The membrane, as time progresses, will lose much of its scarlet hue. In the period which has elapsed

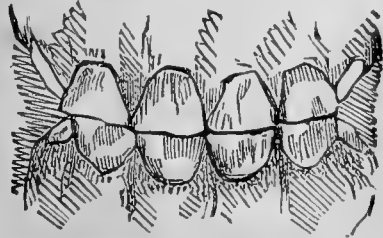


THE INCISORS AT SIX WEEKS OLD.

since the former teeth were looked at, the sense of disproportionate size has gone. The two front teeth are now fully up, and these are almost of suitable proportions. When the two pairs of lateral incisors first make their appearance, it is in such a shape as can imply no assurance of their future form. They resemble the

corner nippers, and do not suggest the smallest likeness to the lateral incisors which they will ultimately become.

There is now a long pause before more teeth appear. The little one lives chiefly upon suction, and runs by its mother's side. Upon the completion of the first month, seldom earlier, it may be observed to lower its head and nip the young grass. From the third month, however, the habit grows, until, by the sixth month, the grinders will be worn quite flat, and have been reduced to the state suited to their function.



THE FRONT TEETH AT NINE MONTHS OLD.

The corner incisors come into the mouth about the ninth month, the four pair of nippers, which have been already traced, being at this time fully developed. The corner incisors, which are depicted as through the gums, do not yet meet, though these organs point toward each other; neither has the membrane of the mouth at this time entirely lost the deepened hue of infancy.

From this date, however, the gums gradually become pale, till, by the end of the first year, the membrane has nearly assumed its normal complexion during the earlier period of existence. All the incisors are, by the first birthday, well up. The grinding teeth which are in the mouth when the foal first sees the light are of a temporary character. The jaw, therefore, has to hold and to mature the long permanent grinders which, within the substance of the bone, are

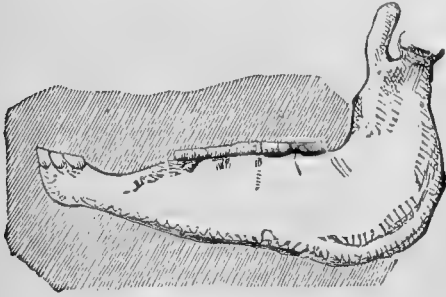


THE JAW OF A ONE-YEAR-OLD.

growing beneath the temporary molars. To contain and to develop the large uncut teeth, before appearing above the gums, causes the small jaw of a diminutive foal to be disproportionately thick, especially as compared with the same structure in an adult horse.

At one year old, the first permanent tooth ap-

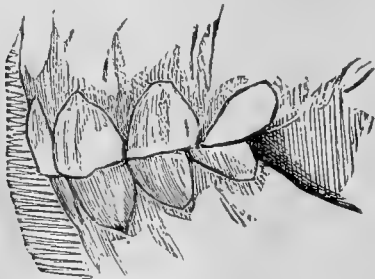
pears. This is the fourth molar, or the most backward grinder in the engraving. The jawbone at one year old has become longer and wider. This increase of size was necessary to cover the increasing size of the new molar, and to afford room for the partial development of two other grinders, which will appear behind what is now the last tooth. Often little nodules of bone, without fangs, merely attached to the



JAW AT TWO YEARS OLD.

gums, appear in front of each row of grinders. These are vulgarly denominated "Wolves' Teeth." They generally disappear with the shedding of those members facing which they are located.

The changes in the teeth, after the first year, are characterized by the longer periods which divide them. Months have, heretofore, separated the advent of single pairs; but, from this date, these appearances are to be reckoned by numbers and by years. The foal has teeth sufficient to support and to maintain its growth. Preparation is being made for the advent of the sixth grinder, and for changes in those milk molars which were in the mouth when the animal was born. At the same time, additional width is needed to allow the permanent incisors to appear when their time comes.

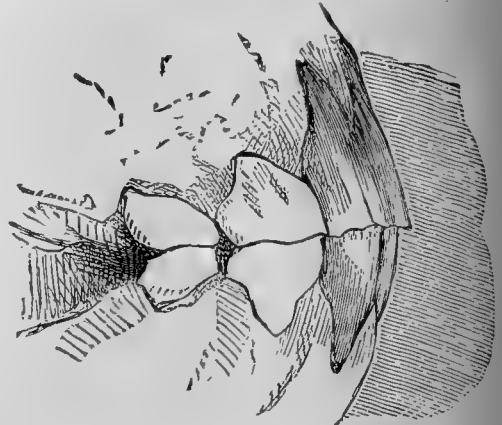


THE INCISOR TEETH AT TWO YEARS OLD.

In the front teeth of a two-year-old, there is a want of that fixedness which, one year before, was characteristic of these organs. The central nippers have done their duty, or, at all events, something approaching to maturity has been attained.

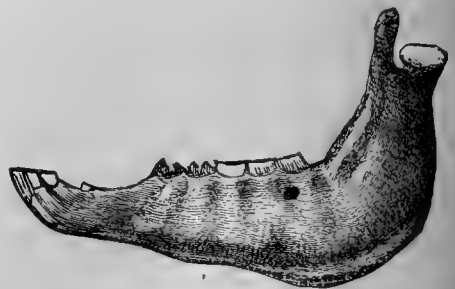
Three years old is the period when the greater number of colts are brought to market. The

bit then is put into its mouth, and it is driven from the field. At a period of change and of debility it is expected to display the greatest animation, and to learn strange things. When its gums are inflamed; when the system is excited; when the strength is absorbed by an almost simultaneous appearance of twelve teeth, it is led from the pasture and made, with its bleeding jaws, to masticate sharp oats and fibrous hay.



THE INCISORS DENOTE NO MORE THAN THREE YEARS OLD.

It has been said that a three-year-old colt cuts twelve teeth. The engraving represents half the lower jaw of an animal of that age. Those organs which are of recent appearance will be recognized by their darker color, by their larger size, or by their differing in shape from the other members. These new teeth are a central incisor and the first two grinders. The horse has two jaws and two sides to each jaw; therefore the same number being present within each side of both jaws, the teeth already alluded to appear during the third year. However, even this quantity rather understates than overrates the fact, for



JAW OF A THREE-YEAR-OLD.

frequently the tushes are cut during this period; in such a case, the colt acquires no less than sixteen teeth in twelve months.

The four-year-old has to perfect as many teeth as are known to protrude into the mouth of the three-year-old. But the precise time of the appearance of the tushes is uncertain. They may come up at the third or the fourth year; some-

times they never pierce the gums, it being very far from uncommon to see horses' mouths of seven years without the tushes.

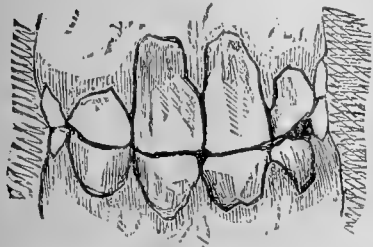
of the mouth now indicates the approach of maturity; but the inferior margin of the lower bone still feels more full and rounded than is consi-



JAW OF A FOUR-YEAR-OLD.



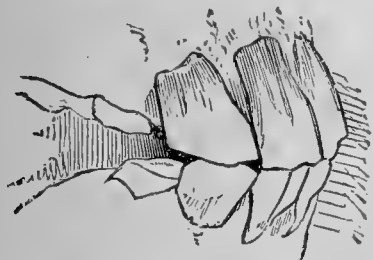
SIX YEARS OLD.



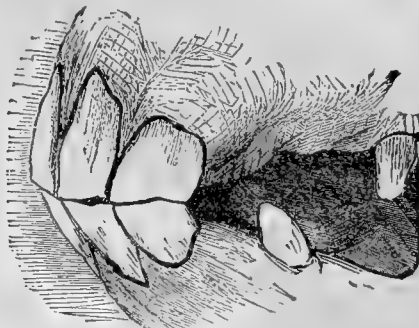
ONE LOWER LATERAL INCISOR BEING THROUGH THE GUM DECLARES A FOUR-YEAR-OLD.

tent with the consolidation of an osseous structure.

The process of dentition is not finished by the termination of the fourth year. There are more



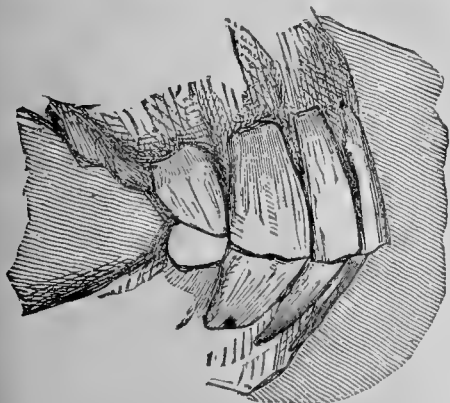
THESE TEETH EQUALLY DECLARE ONLY FOUR YEARS OLD.



SEVEN YEARS OLD.

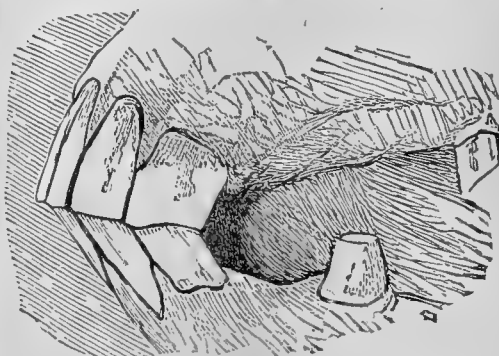
teeth to be cut, as well as the fangs of those already in the mouth to be made perfect.

The colt with four pairs of permanent incisors has still the corner milk nippers to shed; yet,



FIVE-YEAR OLD.

One upper corner permanent incisor has been cut. The lower corner milk incisor is still retained.

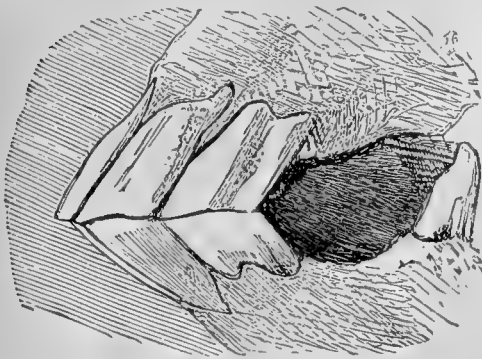


EIGHT YEARS OLD.

By the end of the fourth year, the colt has certainly gained twelve teeth; by this time there should exist, on each side of both jaws, one new lateral incisor and two fresh molars, being the third and the sixth in position. The appearance

while the provision necessary for that labor is taking place within the body, or while nature is preparing for the coming struggle, man considers the poor quadruped as fully developed and as enjoying the prime of its existence.

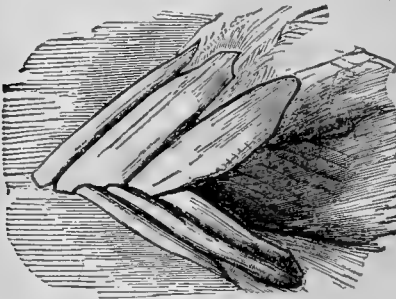
The teeth may be scarcely visible in the mouth, nevertheless such a sign announces the fifth year to be attained. There are, at five, no



TWELVE YEARS OLD.

more bothering teeth to cut. All are through the bone, and the mouth will soon be sound.

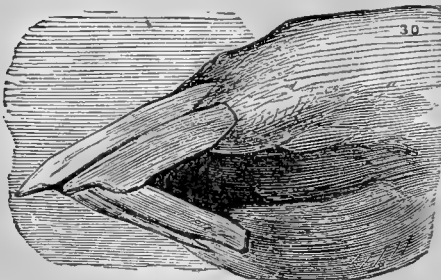
The indications of extreme age are always present, and though during a period of senility



TWENTY YEARS OLD.

the teeth cannot be literally construed, nevertheless it should be impossible to look upon the "venerable steed" as an animal in its colthood.

No man can accurately interpret the signs of



THIRTY YEARS OLD.

the teeth after the fifth year. A guess, more or less correct, can be hazarded; but nothing like confident judgment can be pronounced.

SHOEING.

Rarey's Directions.—"There are very few blacksmiths that ever once think what a complicated piece of machinery the foot of a horse is, and by one careless blow they frequently stop the working of this machine. The majority of smiths, as soon as they pick up a horse's foot, go to work paring the heel, from the fact that it is the most convenient part of the foot, and therefore destroy the heel and braces of the foot, causing, in many instances, contracted heels. The heels of a horse should be well kept up, and the toe down. By lowering the heels you throw the entire weight of your horse upon the back tendon of the legs, and thereby produce lameness from overtaxing a very important set of tendons. By keeping up the heel you throw the weight upon the wall of the foot. In this position you prevent stumbling, clicking, etc. Next the shoer commences to pare away the sole, and thins it down until he can feel it spring with his thumb. Ask him why he does this, and he gives you no reason, except from custom. Next come the bars or braces of the foot, they are smoothed down; next in his ruinous course come the frogs of the feet, they are subjected to the same cutting and smoothing process. All the cutting, paring and smoothing of the soles, bars or frogs is a decided injury to the horse as well as to the owner. All the corns in the land are produced by this process of paring. The frogs have been placed in the foot by nature to expand the wall of the foot, and as soon as you commence to cut one, the oily substance begins to leak out, dries up, becomes hard, losing its oily substance, and makes the wall hard and dry, inducing it to crack.

"The nerves of the feet are very sensitive, and smiths should be careful not to prick the feet, as it requires quite a time to relieve them. The foot is a very complicated piece of machinery, and if you keep a horse well shod and his foot in good condition, you can then generally manage the balance. The feet suffer from being kept too dry. Horses that stand on board floors should have their feet wet every day, or there should be a vat five inches deep, five feet long, and three wide, filled with water and clay, in which each horse can stand for one hour per week, unless his feet are feverish, then he should be kept in an hour per day, or until the fever subsides.

"Another source of injury to horses' feet, is the habit of patronizing cheap blacksmiths. If a man can drive a nail, he then sets up a sign as a farrier or a veterinary surgeon, when in fact he knows nothing of the anatomy of the horse's foot; not having spent any time or money in acquiring the necessary information, he can

afford to shoe a few shillings cheaper than a well-informed man, but the patrons of such cheap shoeing are generally the sufferers. All horse-shoers should be well-skilled veterinary surgeons, or there should be a skillful surgeon attached to every shop.

"Another source of poor shoeing and injury is the loss of elasticity of the frog, which refuses to perform its proper functions; the heel contracts, the foot rolls, and you have a sore horse for the ten or twelve months required to relieve a horse's suffering from being badly shod. The first thing that touches the road or the floor of the stall, should be the frog, and the wall of the foot should be kept cut so as not to prevent it from touching at every step; and no man that owns a horse should ever allow a blacksmith to cut the soles, bars or frogs of his horse's feet. Nature has adapted the frogs to all description of roads, climates and weather, without being pared. So many horses have been ruined by this process of paring, that there are now several establishments in this country that manufacture India-rubber pads, thinking thereby to supply the wasted frog and the elasticity of the natural foot. The frog is insensible to pressure, and you may place the whole weight of your horse on the frog and he will suffer no inconvenience. This is the only reliable way to cure contracted feet; by throwing the weight upon the frog, you force them up between the walls; they act as a wedge, and soon relieve the contracted feet.

"Smiths should never have their shoes hot when fitting them, as the application of hot iron extracts the oily substance from the hoof. The amount of cruel punishment inflicted on horses by cross-grain blacksmiths, is another source of poor shoeing. As soon as the horse does not stand the smith gets angry, and commences whipping and jerking the animal, which only adds terror to it, so that he soon refuses to go to the shop if he can avoid it; it is natural for horses to dislike to be shod, because the hammering shocks the nervous system, until they are accustomed to it. He should be taught to stand, and his feet well handled at home, before he is ever brought to the shop by the owner. You then save the horse pounding, and the smith an immense amount of labor that he never gets any pay for, for no man ever thinks of paying anything extra for shoeing a bad horse. The wall of the foot should never be rasped above the nail-holes, and as little below the clenches as possible; all the rasping and filing but tends to thin and weaken the wall by cutting the fibers of the foot. The nails should be countersunk into the shoe, so that there will be no chance for the clenches to rise. No horse interferes with the heel or toe; it is always the side of the foot.

The habit of turning the inside of the shoe under causes a number of horses to interfere, that would not if they were shod straight in the inside. Spread the heels as wide as possible; set the outside a little under; keep the toes full. For clicking horses, raise the heels high, cut the toes short. For speedy cuts, place your toe-corks a quarter of an inch to the inside of the center of your shoe; keep the heels wide apart. For corns, put on a shoe with a prong, for the main rim, so as to cover the entire frog, pare the wall lower than the frog, so that the entire weight will be thrown on the frog. Have the inner cork not quite so sharp as the outer one, so that if he steps upon the other foot, he will not cut it; make the shoes as light as possible consistently with good service, as they are ordinarily made just about one third too heavy."

Shoeing a horse is understood to signify fastening a piece of iron to the horn which envelops the foot of the animal. Such an operation appears to be a simple affair; but there is no subject associated with veterinary science on which more research has been expended, about which

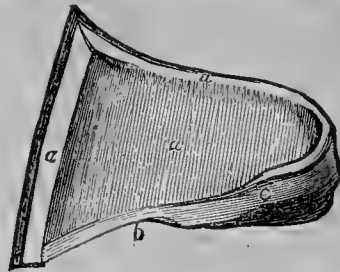


DIAGRAM ILLUSTRATIVE OF THE DIFFERENT KINDS OF HORN COMPOSING THE HORSE'S HOOF.

- a a.* The wall. The outer dark portion is called the crust of the wall, and the light-colored, soft, inner horn is thrown into the laminae, or thin-leaves, whereby it gains extent of attachment to its secreting membrane.
b. The light-colored and yielding horn of the sole.
c. The tinted but elastic horn of the frog.

more bitter discussion has been indulged, or with regard to which proprietors and practitioners are more at variance. Certainly no matter can possibly be more intimately connected with the sufferings and the comforts of the equine race. The arrangement of the nails near to the outer edge, and the fixing of them into the hard outer wall of the crust, are methods still followed, though experience has demonstrated that such numerous bodies, driven almost perpendicularly into a thin and a brittle substance, are better calculated to break the hoof than likely to hold on that which it is their office to retain.

No other mode of driving the nails is at present in general practice; though the modern veterinary surgeon recognizes all the evils which attend the habit, yet these evils he contentedly continues to class as diseases.

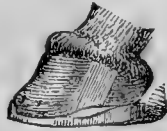
Structure of the Hoof.—The wall of the foot is so much horn as can be seen when the hoof rests upon the ground, and when it is viewed either from the front or from the sides. This wall is supplied from two sources. The coronet, or the prominence to be seen immediately above the hoof, secretes the outer layer of horn, which is the darkest, is very much the hardest, and is the most brittle of all the constituents of the hoof. The laminae, or the highly-sensitive covering of the internal foot, secrete the inward layer of horn, which is soft, tough and devoid of color.

divides from the ground surface to the coronet, the foot's incasement is recognized as unhealthy; but in the forge, the application of such facts, is, by many smiths, utterly ignored.

The Arab Method.—The Arab takes advantage of the united properties of the horn. In warm countries the horse's hoof grows strong and thick, and he allows the wall to descend half an inch below the sole, and right through this portion of projecting hoof he drives the nails which secure the shoe. Thus he does not injure the foot by the insertion of foreign bodies

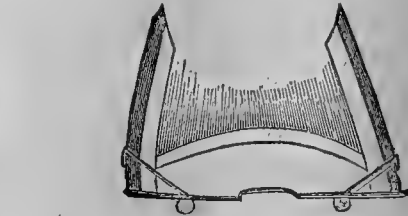


FALSE QUARTER, OR A DEFICIENCY OF THE OUTER WALL.



THE ONLY POSSIBLE RELIEF FOR FALSE QUARTER.

These two opposite and distinct secretions are joined together, forming one body. The intimate union of opposite properties endues the substance thus compounded with the characteristics of both. The hard, outward horn is needed to protect the foot against stones and rocks. The internal, white horn, being fastened upon this substance, acts as a corrective to its harsh nature, preventing it from breaking, splitting and chipping, which it else must have done under the weight it was destined to sustain, and when fulfilling the purposes of the horse's hoof.



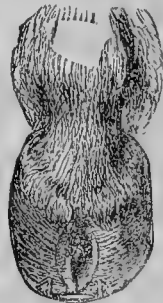
THE MODE OF FASTENING THE ARABIAN SHOE TO THE HOOF OF THE HORSE.

through its more brittle substance, and he secures the united resistance and tough qualities of the complex covering of the foot.

The Usual Method.—But the average blacksmith here, on the contrary, by ranging the holes for the fastenings round the edge of the shoe, drives the nails only into the harder kind of horn, and transfixes the crust for a considerable distance. The nail is meant to pierce only the black or

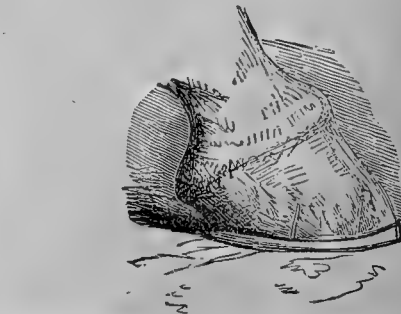


SECTION OF A HORSE'S FOOT AFFECTED WITH SEEDY-TOE.



A FOOT WITH SANDCRACK.

Mischief from Separation.—When these two kinds of horn are separated, the division is known as false quarter, and as seedy toe; and the foot is recognized as weakened, when such a want of union is discovered. The outer, dark-colored horn becomes more brittle; the white, internal horn grows more soft for the want of that junction by means of which each communicated its attributes to the other. So also when the two descriptions of horn, although united, cease to influence one another, this condition is a morbid alteration, known as a changed state of hoof. Thus, when a sandcrack is visible, or the wall



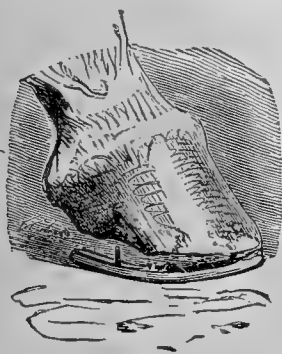
FRACTURED CONDITION OF THE HORN, CONSEQUENT UPON DRIVING NAILS THROUGH THE BRITTLE OUTER CRUST OF THE WALL.

outward substance of the wall. This may, seemingly, afford the better hold; but it is a more dangerous one. There is, likewise, the peril of pricking the sensitive foot, should the nail turn a little to one side, as not unfrequently happens. Another danger is that which the forge calls driving a nail "too fine," forcing it near the white horn rather than sending it directly through the center of the narrow dark crust. There is a third peril. Horses, with thin walls, present difficulties. The smith is afraid of either pricking the foot or driving the nail "too fine;" should this accident ensue, the nail will,

upon the animal being worked, bulge inward, and provoke acute lameness, often causing pus to be generated. To avoid these evils, he points his nails outward; and, by so doing, not unseldom induces the harsh outer crust to crack, to split up or to chip off. To such an extent does this sometimes happen, that the smith is puzzled to find a place where a nail will hold.

It is a common thing to hear veterinary surgeons attribute to the operation of shoeing all the evils by which the hoof is affected. They assert that a colt invariably has an open, healthy foot, until it is shod; but, from the day upon which the animal enters the forge, the horn begins to be irregularly secreted, and the hoof to grow misshapen.

The worst evil which results from a shoe becoming partially released is not the inconvenience it occasions the rider, nor fracture, often produced, on the hoof of the animal. Some portion of the horn first yields. This mishap throws greater stress upon the remaining fasten-



THE SHOE PARTIALLY BREAKS FROM THE INSECURE FASTENINGS, AND ONE OF THE NAILS, STICKING UP, PIERCES THE SOLE OF THE FOOT.

ings. The shoe becomes loose. The majority of the nails give way, but one may continue firm. The shoe is fastened as by a pivot, and with every step swings from side to side. The released nails stick upward—the earth or roadway, as well as the clinches, preventing these from leaving their places. When the foot is in the air, the shoe hangs suspended. When the foot is placed upon the ground, it may be impaled upon the nails that protrude upward. The shoe gets under the foot. The blunt and jagged points are, by the weight of the quadruped, forced through the soft sole or frog at the bottom of the hoof; and a dangerous wound is inflicted, the uneven metal being often driven for some distance into the body of the coffin-bone.

It is objected to the Arabian method, that if the hoof be permitted to grow, the elongation of the horn at the toe and its non-removal by the knife would occasion this portion of the foot to protrude. What the writer contemplates is,

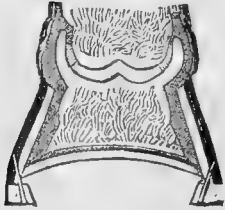
moderating the smith's employment of the drawing-knife and of the rasp, and enforcing some caution in the application of the red-hot iron, when burning a seat for the shoe. Why need the wall be always cut away till it is level with the horny sole? Why bring this last portion of the pedal covering, which is naturally soft and yielding, on a line with that part of the crust which is imbued with a power of resistance? Nay, the harder wall is protected by the shoe on which it rests; while the softer sole is brought near to the ground, being left exposed to an injury, which the lesion known as bruise of the sole proves not unfrequently to happen.

The sole being thus exposed close to the earth, is the fruitful source of many "accidents." The soft horn being brought so low, is rendered constantly wet. The consequence is a harshness of texture, opposed to the evident intent of nature. This harshness is one of the most common sources of corns. The edge of the sole rests upon the web of the shoe—the descent of the coffin-bone, being unable to play upon a yielding sole, squeezes the flesh between the inferior surface of the bone and the upper surface of the shoe. This is acknowledged as the principal source of corns. Stones and other rubbish often become impacted between the horny sole and the shoe. In this situation, the foreign substances are retained firmly and provoke acute lameness.

The shape of the horse's sole, its yielding character, and its position immediately under the coffin-bone, all should be accepted as proofs that it is of service in supporting the weight of the body. It proves nothing to assert that if the sole is removed, the pedal bone will not fall down. The burden may repose upon the numerous laminæ and upon the bulging rim of the coronet, as well as drag upon the lateral cartilages. Here is sufficient material to uphold even a greater load; but can such a force be arbitrarily imposed without provoking nature's resentment? The parts here named are the very regions which are the common seats of foot-disease. Ossified cartilages, irregular secretion of coronary horn, and laminitis, in the acute or in the chronic form, are very common to stables; so also is navicular disease, which the trimming of the frog is also likely to induce.

To rectify such evils, it is proposed that half an inch of crust should be allowed to protrude below a sole of moderate thickness. That all idea of breadth of shoe affording the slightest protection be at once abolished; because the broad web has been proved rather to afford harbor to hurtful matter than to protect the sole from injury. That the shoe be made, only just wide enough to afford bearing to the wall

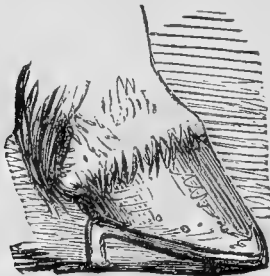
of the hoof, and to allow sufficient room for the nail-holes to pierce the substance of the iron. The crust was designed to sustain the weight of the animal's body, and the most ignorant smith would not think of permitting the entire burden to bear upon the sole. A space large enough to give room for the nails and to provide an ample rest for the wall of the hoof is all that can be of use; and, being so, all additional width only renders the shoe of an unnecessary weight. Ac-



PROPOSED MODE OF NAILING.

ording to this plan, the hold would be much firmer, embracing the two kinds of horn which nature ordained should unite to form the wall of the hoof. A simple puncture is made through all the substance, which, as the opening made is filled with metal, can hardly produce weakness in the structure. The smith usually drives the nail perpendicularly, not through the wall of the hoof, but into its outward investing envelope, or into a material particularly harsh and resentful of interference—thus separating the fibers of the horn, destroying its integrity, and, of course, weakening its capability of sustaining violence.

Calks.—These as usually made and attached to the shoes of the horse, are positive abominations. The shoe, in the first instance, is forged too long for the foot, when, the extra length of iron being bent downward, a calk is established. Such



A HIGH CALK.

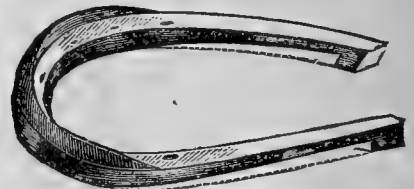
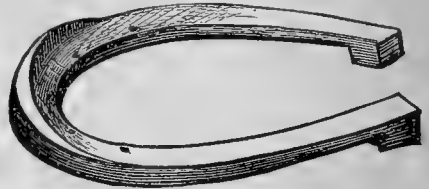
an arrangement throws the entire bearing forward, where it already strongly presses. Although contraction of the tendons is mostly confined to work-horses, and this constrained position of the foot must favor such an affection, nevertheless the smith may receive it as an unjust accusation when he is told that high calks are to blame for the spread of such a state of disease.

The Slipper-Shoe.—To obviate these dangers the following form of shoe has been devised. Its principal peculiarity is the long strip of metal which rises above the upper surface and conceals about three quarters of an inch of the toe. This is not an enlarged kind of clip, but a hollow receptacle, which projects above the shoe and covers part of the hoof. The toe is sheltered within the shallow cavity, whose purpose is to afford the stay which the clip imperfectly pro-



THE FOOT OF A HEAVY ANIMAL, WITH THE SLIPPER-SHOE FIXED ON IT.

vides at the expense of the horn's destruction. When the fore portion of the foot is being dug into the earth, this provision, while it allows the hoof to be employed in its integrity, will prevent



A LIGHT SHOE. SHOWING THE MANNER IN WHICH CALKS MAY BE FORMED WITHOUT ANY INCREASE OF WEIGHT.

The diagram exhibits the Slipper-shoe, as suited for different breeds of animals; also shows the sameness in both kinds of manufacture.

all the stress being transferred to the nails, and thus hinder the clinches being loosened.

The shoe has no web. It consists of a piece of iron the breadth of which is merely sufficient to afford a secure lodgment for the crust. It possesses true calks, but their existence does not interfere with the level of the upper surface on which the foot rests. The shoe is forged of one thickness from toe to heel; and a portion of

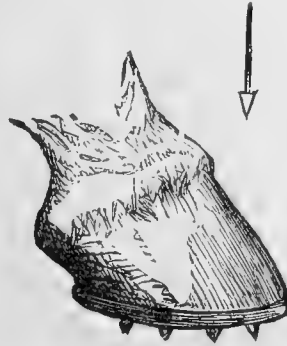
metal under each quarter being removed, leaves the calk, which thus only serves to maintain the evenness of the bearing.

Shoes are generally *fullered*, or have a hollow space, narrow but long, near the outer margin. In this empty void or groove the heads of the nails are received; but as the substance in front is ground down by wear, of course the duration of the shoe must be shortened in proportion to the depth of the fullering.

By the next illustration, which represents the ground surface, the reader will perceive an indented void near to the outer margin. Behind this indentation or fullered cavity the iron gradually slopes away so that the substance which is exposed to wear, and on which the horse must travel, consists of the narrow strip that extends round the outward edge of the shoe.

The proposed shoe contemplates iron of an equal thickness at every point usually exposed to wear. The nails are driven into holes made to fit close around the heads of those fastenings, so that the shoe being fixed, no loss of substance is to be detected; for the nail-heads fill the spaces

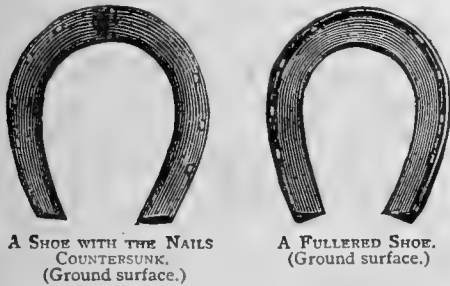
Slippery Weather.—Some person, many years ago, proposed to use nails with large steel sharp-pointed heads, during the prevalence of frost. This plan was tried, and signally failed. The constant renewal of the nails was found ruinous to the hoof; for the strongest of the projecting heads was unable to resist the grinding action of a horse's foot longer than twenty-four hours. Then, many of the heads broke off while being



A SHOE INTENDED TO ENABLE A HORSE TO WORK IN ICE, WHICH IS FIXED ON TO THE FOOT WITH SHARP-HEADED AND PROJECTING NAILS.

driven, and not a few were fixed in a damaged condition, owing to the blows received from the heavy hammer of the smith.

The second cut illustrates another plan. Large holes, containing the thread of a female screw, are made through the heels of the winter shoes, and several steel points, manufactured with a male screw, adapted to the dimensions of the holes just mentioned. Whenever the roads are



which were countersunk for their admission. The nails pierce the toe of the proposed new shoe. This part is selected, because this portion of hoof is covered with the thicker horn; therefore is indicated as the region where all stress should bear. Among smiths, there is a strong objection to driving nails in the center of the wall. Yet a more violent outrage is inflicted by actually removing a portion of its substance, so as to make an abiding-place for a clip, than by piercing obliquely the strongest part of the hoof, subsequent to the toe having grown below the true foot. The thickness of wall there offers several advantages, when considering the retention of nails. The solidity of the secretion is a proof that this portion of the hoof is not endowed with motion. Consequently, when fastening a piece of iron to it, we are not fearful of interfering with the exercise of a healthful function. Such would be the case if the nails were to fix the quarters, where the joint thinness, moisture and elasticity of the horn afford the best evidence nature meant them for expansion and contraction.



A SHOE WITH POINTS WHICH SCREW ON AND OFF, DESIGNED TO FIT A HORSE FOR WORK DURING FROSTY WEATHER.

icy, all that is requisite a boy might perform. The hole in the shoe has to be cleared out, and afterward one of the points screwed into the opening. When these points are worn down, they are easily renewed.

Paring the Foot too small.—Sometimes a smith pares and rasps the horse's foot, to make it fit a shoe he has, instead of making the shoe fit the foot. The result is worse than that of tight shoes on the human foot. The walk is strange, as though the poor creature were trying to pro-

gress, but could obtain no bearing for its tread. The legs are all abroad, and the hoofs no sooner touch the ground than they are snatched up again. The head is carried high, and the coun-



A FOOT PROPERLY SHOD, AND A FOOT WHICH HAS BEEN CRUELLY RASPED, TO MAKE THE HOOF SUIT A SHOE THAT WAS TOO SMALL FOR IT.

tenance denotes suffering. It is months before the horn is restored to its normal condition.

Cutting, or Interfering.—This is an annoying fault in a horse, and when the cutting takes place near the knee may become dangerous.



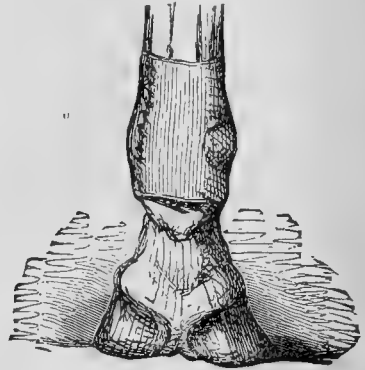
THE KIND OF HORSE NOT LIKELY TO CUT.

Weakly, long-legged and narrow-chested horses are apt to cut, as are creatures with cow-hocks. Many young horses strike in going; but they lose the habit as age matures the strength.

Sometimes a ring of India-rubber has been employed as a protection against this annoyance; but it is not calculated to realize any practical expectation. Some horses will only cut during the latter portion of a long journey, or when thoroughly exhausted. Others are afflicted with a chronic description of weakness, and such animals may cut with the first step. These creatures require less work or entire rest, with a course of tonics, both in food and medicine.

The horse which exhibits a wide chest, and stands with the feet not too close together, very rarely cuts. The animal which possesses well-made haunches with prominent hips and swelling thighs, that appear full, round and fleshy, especially when such a creature places the fetlocks under the hocks, must be driven very far and pushed very hard before he will interfere.

Boots are employed a great deal to prevent cutting. A form of one is here given, made of pre-



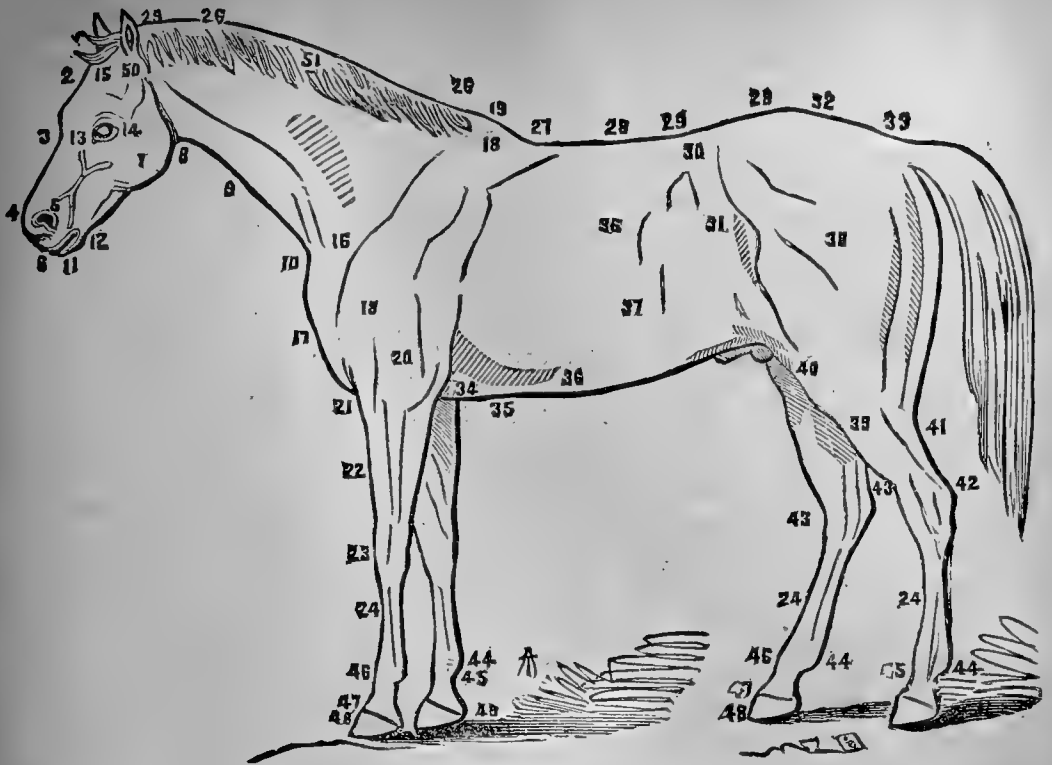
A LEATHERN BOOT.

pared horse-skin having the hair on, and laced upon the member. Over the seat of injury a concave piece of stout leather is let into the covering, and the hollow thus formed, which acts as a protection, can also receive a portion of lint saturated in the lotion, prepared by adding one grain of chloride of zinc to an ounce of water. Thus, while the sore is spared a renewal of the cause, curative treatment is not stayed.

The forms and positions of these boots make a curious sight for an observer "down the road," or on the race-track. Sometimes each leg of a horse will be decorated by them. They are often worse than unnecessary, and put on to give the horse a *tony* look.

But many horsekeepers do not favor the use of boots at all, but simply rub any part which has been hit, with axle-grease or vaseline.

We are indebted to the courtesy of Dr. L. W. Warner, 67 Murray Street, New York, for the following diagram, and also for the one to be found at the head of "Diseases."



POINTS IN A HORSE.

- | | | | |
|------------------------------|------------------------------|------------------------|-------------------------|
| 1. Fore-hand. | 14. Inner corner of the eye. | 27. Middle-hand. | 40. Stifle. |
| 2. Forehead. | 15. Foretop. | 28. Back. | 41. Hamstring. |
| 3. Face. | 16. Neck. | 29. Back-hand. | 42. Point of the hock. |
| 4. Nose. | 17. Breast. | 30. Loin. | 43. Hocks. |
| 5. Wings of the nose. | 18. Shoulder. | 31. Hip. | 44. Fetlocks. |
| 6. Muzzle. | 19. Withers. | 32. Croup, or Rump. | 45. Small Pasterns. |
| 7. Jaw. | 20. Arm. | 33. Dock. | 46. Large Pasterns. |
| 8. Throat. | 21. Forearm. | 34. Elbow. | 47. Crown of the hoof. |
| 9. Windpipe, or Trapple. | 22. Forelegs. | 35. Girth. | 48. Hoof. |
| 10. Point of the shoulder. | 23. Knee. | 36. Barrel (the Ribs). | 49. Heels. |
| 11. Chin. | 24. Cannon-bones. | 37. Flank. | 50. Head. |
| 12. Curb of the chin. | 25. Nape. | 38. Quarter. | 51. Mane, or Mane Hair. |
| 13. Outer corner of the eye. | 26. Crest. | 39. Thigh. | |

POINTS.

Stem and Rudder.—The skeleton is the framework of the trunk and limbs. The vertebræ constitute the base, toward which the other bones concentrate, or from which they originate. At one end of the back-bone is the skull; at the other extremity, the tail. The arrangement accords with the system observed in a well-regulated vessel: The look-out stands forward; with the steersman at the stern. The tail, in the quadruped, principally directs the course. We perceive the folly of those people who excise or mutilate so important a part. The animal, gazing in the desired direction, inclines the body toward that point; while the tail, simultaneously moved in an opposite course, sways the trunk into the proper track. The flowing hair, operated upon by the wind, gently favors the inclination. The reader will comprehend the reason why a short tail is rarely compatible with

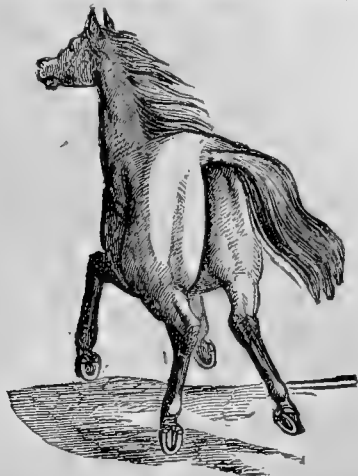
perfect safety. The appendage which men regard as chiefly of service to switch away the flies, has a higher and more important function.

The turning or guiding power having been pointed out, the attention must next be directed to the region where all strength centers, and from which all ability for motion proceeds.

The Lumbar Region.—Looking down upon the spine of a horse, one cannot but notice that the widest portion of the body is across the hip-bones. The posterior parts, or those behind the projections, are not of uniform size; but they are more bulky and more fleshy than the forward surfaces of the body. Flesh is another term for muscle; where flesh is most conspicuous, there is most strength. The muscles of the hind limbs spring from a large bone, variously named the haunch-bone or the pelvic-bone. This bone joins the spine at the hips, and thus lends support to the posterior region. But the vertebræ, immediately before the hips, are aided by no

such accessory. The loins stand alone, entirely without support. This part of the body consists merely of certain bones, over which and under which run thick layers or solid masses of muscular fiber.

A comprehension of the osseous weakness apparent in the skeleton of the loins must show the absolute necessity for some compensating agency. The loins should be bulky or muscular.



THE SPECIAL USE OF THE HEAD, MANE AND TAIL, WHEN EMPLOYED TOGETHER.

They cannot be too large; but may be too small. Small weakly loins admit of no compensation. The position of the part is peculiar. It is intermediate and lies between the haunches, which are the propelling powers, and the thorax, which is formed to endure, to support or to uphold what the back carries. All intermediate structures demand strength; because their office is simply to transmit that impetus they directly receive. Accordingly, the development of the loins, both in man and in horse, may be taken as the best proof of vital power. The loins receive and convey onward the propelling force of the



THE BACK OF THE HORSE, AS SEEN FROM ABOVE.

quarters. When the body is suddenly checked, they have to overcome the energy of the onward impetus, to endure the full violence of the sudden arrest of the forward motion in both the animal and its burden. In leaping, galloping, etc., the position of the region and the duties involved by it are obvious. Muscular loins are imperative in racers and in saddle-horses; it is impossible the rider should be safely carried unless the back be strong. The animal designed for light harness purposes can, perhaps, best

dispense with such an essential, although even then weak loins are usually associated with a narrow chest, a lanky frame, and a total lack of endurance. Whether for strength or appearance, speed or endurance, breadth of loins is always essential. There is no property for the possession of which the quadruped can be valued that is not dependent upon this portion of the frame for its exhibition.

The Back.—The back-bone of the horse, lumbar bones and all, is often remarkable for very opposite developments. These are sinking down or curving inward, and rising up or arching outward. When the line declines more than usual, the form is denominated a "hollow back" or a "saddle back," and is generally supposed to be indicative of dorsal debility. Animals of such a formation, however, are commonly possessed of high crests, full loins, as well as lofty haunches, and they generally exhibit proud action. They are usually conspicuous for many estimable qualities. They are generally very docile, and uncommonly good-tempered. They display numerous excellent points; and sometimes exhibit such prominent good qualities as in many occupations may be justly esteemed more than an equivalent for their bodily deficiency.

Neither a long nor a short backed horse is, necessarily, desirable. All depends upon the strength of those muscles which support the spine; though, other points being equal, length generally provides a springy seat for the saddle: whereas a short back commonly possesses greater endurance. A long back, with bulging loins, is, however, infinitely preferable to a short back with deficient lumbar muscles. The mere extent of a part can be no absolute proof in either direction; though, should a choice lie between two animals, each equally deficient or equally favored, the short back should be preferred, because all increase of length necessitates a greater strain upon the organs of support.

The Tail is a continuation from the vertebræ. Therefore there is reason why a stout dock or a thick root to the tail should be regarded as a sign of excellence; because the part affords some evidence concerning the stoutness and muscularity of the spine itself. Nevertheless, it allows of nothing stronger than an inference. But the position of the tail affords more than an inference. It should originate level with the prolonged line of the back, and should look the thing it is, a continuation of the spine; for, so placed, it means a greater length in the posterior muscles of the haunch, some of which extend from the last bone of the vertebræ almost to the hock. In a body whose power is dependent on contractility, of course length of substance favors

the ability to shorten or to contract. Animals with tails "well set on" are commonly remarkable for speed and activity. The Arab naturally carries his tail erect; and by the rapidity of its motions, together with the power of the organ, an explanation is afforded of the ease and the grace with which this breed of horses can perform the most difficult evolutions. The tail of the thorough-bred, by its position and its graceful carriage, reveals its lineage. The reader will be surprised to notice how seldom horses have tails well set on. In short, the position of the tail, if employed as a test for excellence, would condemn the majority of quadrupeds. But the tail should be examined, not as an absolute proof of properties, but as suggestive of breed.

The Head.—The course of the body is greatly governed by the position of the head. The bit, operating upon a natural mouth, can sway the body during the highest speed; for by the inclination of the head is the trunk to be turned. It is imperative, for the ease and safety of the rider or driver, that the head should be well set on, and carried without sensible restriction. If the rein is held too tight and a false step is made, or if the foot is placed upon a rolling stone, the quadruped is almost certain to fall; for the rapid motion of the head being impossible, it cannot be used to restore the disturbed balance. Bulk indicates muscle; therefore a neck, if properly shaped; cannot be too thick; the majority of the cervical motor agents extend either to the trunk or to the forelimbs. The size of the neck, consequently, influences other regions, and confers positive advantage of both strength and activity. A head well set on is carried in advance of the body only so far as may be necessary to counteract the comparative lightness of the forward structures.

The Neck.—Thinness and smallness of neck is one of the peculiar features of emaciation in the horse. It is always seen in the old and in the half-starved quadruped. It is never a sign of vigor. The illustration exhibits a peculiarity of form confined to the heavier breed of draught-horses. Such a neck is alone compatible with slowness. It is, however, falsely imagined to denote excessive strength. So far as thickness is concerned, muscle must be present, or adipose tissue must abound; but there is a deficiency of length which will necessarily limit the motor power. The huge mountains of flesh which parade the streets of London before the brewers' drays, are not remarkable for power of draught, capability of endurance, or for long life.

The ewe-necked horse is one in which every appearance of crest is absent. Such a form may possess length; but it is generally wanting both in depth and in substance. Animals of this

formation are generally active, but weakly: other parts are too often characterized by a narrowness of build, which materially detracts from a capability for endurance. The appearance is, moreover, mean; and is usually rendered more conspicuous by a thinness and a shortness of mane. The shape of the neck is not, however, to be considered merely as governing other



A BULL-NECK.

organs, but is also to be regarded as a consequence of a prevailing absence of development.

Certain judges are prejudiced in favor of a short neck. The characteristic is in their minds associated with bodily strength; but it cannot



THE EWE-NECK.

denote the existence of such a quality, because an absence of length must reduce the amount of muscular fiber.

The Ear.—With the health of this organ the general safety is associated; for the acuteness of the animal's hearing affords no mean protection. Absolute quietude of the ears indicates that sounds are not heard. Excessive restlessness of these parts suggests that, by straining one sense, the animal is endeavoring to supplement dullness of another: that the vision is lost or imperfect:

A lively carriage of the ears expresses a sprightly temper, and generally denotes a kind disposition; whereas one ear constantly directed forward and the other backward, is an indication of "vice" or of timidity.

The Eye.—Many people will pretend to discover the disposition of a horse by the character of the eyes. A restlessness of the globe, the display of any unusual quantity of white, and a perpetual tension on the upper lid, are imagined to signify a "vicious" inclination; but these traits express only the watchfulness of fear. Such indications are evidences of suffering which has been experienced; and denote an anxiety to escape future brutality. A prominent eye, expressive of repose, and not showing much white, has been pronounced to be declarative of honesty, though certain parties have condemned it as indicative of slothfulness. Quickness or activity, as contradistinguished from restlessness in the eye, is, however, to be desired. The small eye usual with the coarser breed of animals should be avoided, because it is generally accompanied by a heaviness of movement. The retracted or deep-set eye, which displays the organ only partially, is somewhat angular in figure, and is commonly spoken of as "a pig-eye," denotes either weakness of the part, or a previous attack of specific ophthalmia.

The Lips.—The lips of the horse are far more important organs than many suppose. They are, so to speak, the hands of the horse; and if any one will observe the manner in which he gathers up his corn with them, and collects together the grass before he divides it with his nippers, he will see that the horse would be no more able to convey his food to his mouth without them, than the human being could without his hands. This has even been put to the test of experiment. The nerves which supply the lips were divided in a poor ass, to illustrate some point of physiology. The sensibility of the lips was lost, and he knew not when he touched his food with them; motion of the lips was lost, and he could not get the oats between his teeth, although his manger was full of them; at length, driven by hunger, he contrived to lick up a few of them with his tongue; but when they were on his tongue, the greater part of them were rubbed off before he could get them into his mouth. It is on account of this use of the lips, that the faces of all quadrupeds are so lengthened, that the lips may be brought into contact with the food, without inconvenience or injury to other parts of the face.

The lips are composed of muscles for the sake of strength, and of a multitude of small glands, which secrete a fluid that covers the inside of the lips and gums, in order to prevent friction, and

likewise furnishes a portion of the moisture so necessary for the proper chewing of the food. The skin covering the lips is very thin, because, if these are the hands of the horse, they should possess considerable feeling; and for the same purpose likewise, they are scantily covered with hair, and that hair is fine and short, and long hairs or feelers, called the beard, are superadded for the same purpose. The horse is guided and governed principally by the mouth, and therefore the lips are endowed with extraordinary sensibility, so that the animal feels the slightest motion of the hand of the rider or driver, and, as it were, anticipates his very thoughts. The *fineness* or *goodness of the mouth* consists in its exquisite feeling, and depends on the thinness of this membrane.

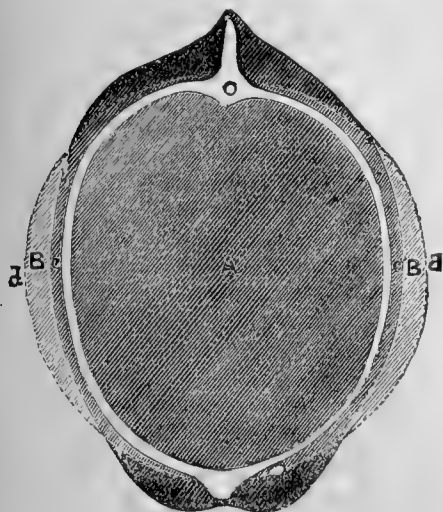
The lips of the horse should be thin, if the beauty of the head be regarded, for if they are loaded with fat they cannot be as sensible as they ought to be: yet, although thin, they should evidently possess power, and be strongly and regularly closed. A firm, compressed mouth gives a favorable and no deceptive idea of the muscular power of the animal. Lips apart from each other, and hanging down, indicate weakness or old age, or dullness and sluggishness. Examine the angles of the lips. If any sign of induration is remarked, it signifies that the animal has suffered from the abuse of the bit. If on any limited space, however small, a patch of white skin is observed located upon a dark ground, it denotes that at some time the true skin has been removed from that place. If anything like a hardened lump should be felt in this situation, it demonstrates that the quadruped has a hard mouth, and is an obstinate puller, or that it has passed through the hands of an unfeeling master.

The Nostrils.—These organs admit the air inhaled by the expansion of the chest; consequently the dimension of the nostrils allows an inference as to the capacity of the lungs. This opinion, however, should be only advanced after the alteration has been noted between their size when at rest and when excited: Should no marked variation be observed here, then the value of the animal is to be considered only in connection with slow work, as speed must be regulated by the capability of receiving a quantity of vital air proportioned to the power exerted. After the capacity has been observed, the nature of the movements of the nasal openings should be noticed. Subsequent to exertion, ease of motion is not to be anticipated; but nothing approaching to spasmodic action should be remarked. The nostrils ought to be regularly expanded; not to fly open with a jerk, or to suddenly enlarge their form, as under the influence of a gasp. A capability of dilatation, attended with an evenness of

motion, however fast the movement may be, are the points which should be looked for in the nostrils of a horse; because the characteristic changes attending inhalation best expose any defect in the respiratory apparatus; for, by such a test, the remotest disposition to become a roarer, or to exhibit diseased wind, is easy of detection.

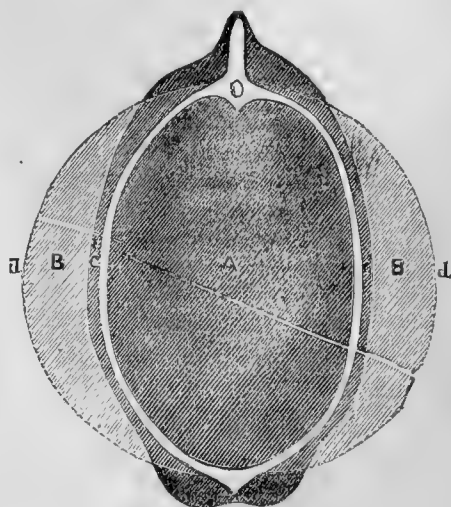
The Thorax and Lungs.—There is much dispute concerning the best form of the horse's thorax; but such a question can only be decided by the uses to which the animal is to be put. All creatures in which speed is not required, should possess circular chests; for by such a shape they are adapted for the accumulation of fat, and for the performance of slow, of continuous or of laborious work. There are, however, numerous animals which are required to possess capability for a

required to uphold vitality; therefore this kind of quadruped exhibits, as a general rule, no great tendency to fat. During all quickened movements, however, the action of the lungs and the speed of the circulation are much increased. It is not the size or dimension of its thorax which determines fleetness. That quality depends on the adaptability of the cavity to the exigencies of excitement; for such purposes, the quadruped with a round chest is not to be preferred. There is no instrument by which the motions of the horse's ribs can be accurately ascertained: they must be guessed at. A quarter of an inch between the enlargement of the ribs in different animals (supposing other points equal) will more than determine the winner of a race, since the revitalizing of the blood regulates the other properties of vitality.



THE THORAX OF A CART-HORSE.

A A. The capacities of the two chests in the quiet condition.
B B, B B. The limits of expansibility in each when excited.



THE THORAX OF A BLOOD-HORSE.

c c, c c. The outside of the coat in the quiet condition.
d d, d d. The surface of the body in the excited state.

“burst;” for the rush or the closing struggle of a race. The creature of speed, therefore, should exhibit rather the deep than the round thorax; for fat is not desired on such an animal. The deep cavity, moreover, admits of an expansibility which is imperative during intense muscular exertion. Suppose the lungs of the cart- and of the blood-horse, when expanded to the uttermost, occupy the like space. When not excited, or both being of normal size, the respiratory apparatus of the coarser breed is by far the larger of the two. In the passive condition, the heavy quadruped inhales much more oxygen than is needed to vivify the blood. The excess is, therefore, appropriated by the food and nourishes the frame; hence dray-horses have a tendency to become fat. On the contrary, while at rest, the lungs of the thorough-bred receive scarcely more air than is

The Abdomen.—Most judges admire a horse with a belly apparently well filled by its contents. Certainly this appears to be the soundest of the many prejudices which appertain to horse-flesh. The shape of the thorax must, in no unimportant degree, regulate that of the abdomen, the two cavities being only parted by a fleshy screen denominated the diaphragm. The herring-gutted quadruped is commonly as deficient in the respiratory as in the nutritive functions. Of course this rule is not absolute; but a capacious thorax is required to counteract any defect in the process of nutrition. The animal which rapidly narrows toward the flank generally purges upon work, is of a washy constitution, and possesses a bad appetite.

An animal with a deep chest and with high withers, almost as a necessary adjunct, possesses

a slanting shoulder; or, at all events, this probability is favored by that particular formation. Such an arrangement of parts must be accompanied by an upright position of the humerus and the advanced location of the forelimb. This conformation is bettered, materially, by an arched crest and a head "well set on." Unfortunately, this combination is seldom encountered.

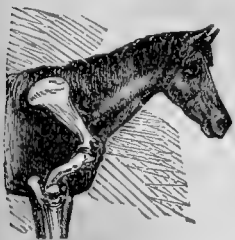
The Legs and Shoulders.—The legs of a horse can hardly prove too short; for shortness of limb is an accompaniment to depth of chest and proportionably powerful quarters. The long leg always attests the light carcass: the motor agency of the limbs is deficient, while the cavities of respiration and of nutrition are necessarily diminished. A narrow thorax almost necessitates low



A SLANTING SHOULDER IN ACTION.

withers and an upright shoulder. The bone of the arm, or the humerus, is pushed into an undue slant by the forward position of the blade-bone, or of the scapula. This compels the front leg to stand too far under the body. Such an arrangement favors neither beauty, speed nor safety; in fact, it is one of the worst forms which the components are capable of assuming.

The Withers.—The action of the shoulder-blade, during progression, is upward and backward, or it is drawn toward the highest processes of the withers. Low withers are, of course, opposed to extended motion in such a line. The lessened action of the bone necessarily limits the movement of the structures which depend from it, or the action of the humerus is governed by that of the



A STRAIGHT SHOULDER, SHOWING THE POSITION OF THE BONES.

shoulder-blade. The short motion permitted by low withers, therefore, limits the advance of the

forearm, the parts being, as it were, tied together. The natural carriage of such a malformation is with the head and neck protruded, so as to favor progression by strain upon the cervical muscles. At the same time the body inclines forward, which throws the limbs backward, or out of their proper situations; and this circumstance indicates why animals of this particular make so frequently encounter "accidents."

The Lower Leg.—It remains to direct attention toward that which in general acceptance constitutes the forearm, as well as the knee, the leg or the shin, the pastern and the foot. Where the limb quits the trunk, it should be characterized by muscular developments, since at this place resides the chief of that power by which the lower portions of the member are directed. The flesh should bulge forth, and cannot be too abundant; for a thin forearm is incompatible with goodness in a horse. The point of the elbow should be prominently emphasized, as this bone affords a leverage whence many important muscles originate, and which some of the principal flexor agents directly operate upon. Toward the knee the swelling should gradually subside, leaving upon the surface of the joint a broad, clean, and firm appearance. At the back of the knee there should stand forth, or rather should stick out, an osseous point, the size of which is of value, as it affords a point of insertion to the short flexors of the limb, as well as gives shelter to the perforans and perforatus tendons in their passage toward the pastern and the foot. Its magnitude, therefore, not only favors muscular action, but also indicates the dimension of those important structures which this bone protects.

The forearm should be long; the shin should be comparatively short. The reach depends on the first, the length of which secures an extra amount of motor activity. No muscles of importance are located upon the shin: bone and tendon are the principal components of this region. The part should not be absolutely straight; at the same time it ought to present no obvious inequalities or sudden enlargements. The bone should be compact, giving to this portion of the limb, when viewed from the front, almost the appearance of being deficient in bulk; but when regarded from the side, the lower part of the leg cannot be too broad; for breadth and strength are here synonymous. The above rule applies to both legs,—to the hind limb below the hock as well as the fore, from the knee downward. Each should be thin, when viewed from the front. Neither can well be too deep, when seen from the side. Both should appear solid, and each should feel almost of metallic hardness. The pastern-joint should not present a level surface, when viewed laterally; and as it proceeds

downward to join the foot, a gradual enlargement should take place.

The inclination of this region is governed by the major flexor tendons which are situated underneath or behind them. Their slanting, therefore, is regulated by no peculiarity in the forms of the bones themselves, but is controlled by and dependent upon the condition of another structure. A short, upright pastern, if it can bear any evidence at all, testifies to a stubborn and un-



A LONG AND SLANTING PASTER.N.



A NATURAL PASTER.N.



AN UPRIGHT PASTER.N.



AN OVERTHOO PASTER.N.

yielding state of the great flexor muscles, the weight being then thrown upon the osseous supports. The play of the pastern denotes nothing more than the healthy elasticity of the flesh upon the tendon proper. The bones have no motor power belonging to themselves. The upright and the overshot pastern suggest no change in the more solid frame; but such alterations prove that excessive work has strained the great flexors of the limb, and destroyed the inherent property

of elasticity with which every muscle is endowed by nature. The burden being then supported by an osseous pillar instead of an elastic band, of course jar or concussion ensues.

The flexor tendon likewise influences another part. The perforans is inserted into the sole of the coffin-bone, or into the bone of the foot. The direction in which the toes point is, therefore, regulated by a substance so far distant that the attempt to connect the two organs may, to the uninformed mind, seem ridiculous. Yet, the statement being correct, the fact renders the position of the elbow of more importance; for according to the situation of that bone the hoofs will be directed. Thus, an ulna or an elbow which is drawn toward the trunk will be attended with a toe inclined outward. When the bone turns from the body, the forward portion of the hoof is directed inward. When the framework is properly constructed, the hoofs point forward; for horses' hoofs are liable to those derangements which the human foot exhibits, and generally with like results. Only, in man, striking one leg against the other, while walking, is not attended with the unfortunate consequences the same thing induces in the quadruped

"VICES," SO CALLED.

Toothy and Temper.—W. E. Burton, in the old Chambers Street theater, on whose site is the present edifice of the American News Co., having the care of a wayward child, walked it up and down the stage, exclaiming in response to one scream of the young one, "That's toothy;" and in answer to another yell, "That's temper." It is hard often for a person even in his own case, to be sure whether he ought to be pitied, or to be blamed. And it is hard in one's own case, how much harder in the case of another, who can tell you of his "subjective" experiences. But how much harder still the problem becomes, when its object has not at command, as has man, the power of articulate utterance. If the horse could only speak, it is probable that his share of real "vice," mischief for which the will is answerable, would compare favorably with his master's. He cannot tell of his nervousness, his fear, the dread of additional abuse, the dyspepsia, and heaviness improper, scanty or excessive food may have occasioned; the results of a previous wakeful night: the thousand and one disturbances for which a man or a woman expects and receives sympathy, not blame. Without denying that the horse sometimes misbehaves from "temper," it is undeniable that sometimes also, perhaps oftenest, he suffers from "toothy." But if those who have charge of horses would try to supplement their deficiency of speech, and to find out what each animal

would gladly tell them if he could, the necessity for so-called discipline would almost disappear, and the whip and spur and club follow the harsh methods once used with those then regarded as possessed with a devil, but now cared for as the victims of disease.

Horses not totally Depraved.—Mayhew, the great English authority in veterinary matters, discredits "vice" as applied to a horse, as emphatically as Dr. Channing did "total depravity" as applied to a man. He tells that he was of middle age when he entered the Veterinary Collège, and unfamiliar with horse-flesh. He needed an animal, so that reference might be made to its body for an explanation of the books he was to comprehend. At length, in the corner of a back yard, was discovered a lonely loose box. Inside was a quadruped; and to this place a volume was daily taken, with various morsels of bread or vegetable. There, between feeding, reading, examining and caressing, many an afternoon passed. It was necessary to indulge in certain intimate familiarities, sometimes to change the position of the animal, or to finger its lower extremities. He had no jockeyship to protect him; did not indeed know that any protection was necessary. He used to shut himself up with the companion of his studies, and spent his time very happily. After a fortnight of this experience, as he was one day going to the loose box, he was seen by a number of his fellow-students, who exclaimed: "Mayhew, where are you going? Don't open that door! 'Van Amburg' is there. He's a kicker and a biter! You'll be killed! Don't open the door!" Van Amburg was the name of a thoroughbred racer, which had been sent to the Collège "for operation," because of its supposed ferocity. He exclaims: "Yet I, a novice, had passed many an hour in its society, and assert that I could not have desired a more gentle companion. We have often lain long together side by side; or, as I reclined upon the straw, reading, the head would rest upon my shoulder, while a full stream of fragrant warmth would salute my cheek. Still, such a creature, so open to advances, so grateful for little kindnesses, was a reputed savage!"

Balking, or Jibbing.—These words are very common among horsemen. Balking, however, does not specially imply one act; there are many kinds of behavior which are so designated. Thus, a horse which is unable to start, is called "a balker," as is a quadruped which, in the middle of a journey, shall be suddenly impelled to move in a backward direction. The animal which, upon hearing the command to proceed, will begin to throw up its head, and, spite of chastisement, bear in the opposite direction, is also supposed to have learned the "vice." "Balking" of

every kind appears to be no "vice," but a nervous disorder,—a sort of equine epilepsy. A word spoken sharply can summon the attack, which generally deprives the animal of all power of motion, or forces it to move in a direction the opposite of that on which it wishes to proceed. The movements are independent of the will; and if any person will attentively inspect the countenance of a horse, when in the act, the real character of the supposed "vice" will be recognized. A spasmodic fit has possession of the frame. It is useless to flog or to inflict other tortures. The attack will last a certain time, and then, perhaps, suddenly vanish. No brutality can shorten its duration, though cruelty, possibly, may lengthen the convulsion. Severity has lost its power to quicken timidity. The lash will not influence; nor the human voice. The body is acted upon by a power stronger than the will. At last the spell is broken. The ability to guide the limbs is suddenly regained: but the brain is congested and the senses confused. The crea-



THE COUNTENANCE OF A HORSE DURING A FIT OF BALKING.

ture, upon partial recovery, may exhibit a desire to bolt—may, for an uncertain period, be all but unconscious. Sometimes it will recover its powers suddenly, almost as though its previous condition had been assumed. On other occasions it may, under some impulse, tear onward, regardless of the road, as though it sought to escape the scene of suffering, or lose the pain of convulsion in the rapidity of motion.

Balking is most common among harness-horses, the faces of which are disguised and partially concealed by the blinkers. The countenance of a horse, when in this act, calmly contemplated, will dispel all belief in "voluntary vice." The eye is strained inward; the teeth are firmly set; the nostrils are dilated; the breathing is spasmodic; and the muscles are rigid. There is, however, one symptom which, although expressive of terror, agony or faintness, all horsemen are agreed in regarding as showing a "vicious intention." Such is the backward position of the ears, or the laying of those organs

upon the animal's neck. The forward carriage, or the "pricking" of those members, is recognized as expressive of delight, of gayety or of attention. What, then, does the backward position signify? What ought to be implied from the falling of a part whose upright bearing is interpreted to be the sign of liveliness? Yet, how many tender-hearted gentlemen, abused by the prejudices they inherited, will, when they observe the ears laid back, unhesitatingly lash the body which, probably, was far from contemplating mischief!

When an animal is thus afflicted, never pursue the course usually adopted. All noise should be prevented; no flurry should be permitted. Do not use the whip, or jag the reins; relinquish both. Empty the vehicle. Undo the check-rein; loosen the harness. If possible, remove the quadruped from the shafts. Go to the head: speak soothingly; pat and caress the agitated frame. Procure some cold water; soak a thick cloth in the liquid, and lay it over the brain and upon the eyes. Sponge out the mouth and nostril; then empty the vessel, by dashing the remaining fluid into the animal's face. When the incapacitating stage is subsiding, don't let him bolt. This done, return the horse to the stable. Never hazard riding behind a creature which has recently suffered with "equine epilepsy."

"Kidney-Dropping."—Sometimes a horse in harness, not overloaded, and pleasantly jogging along, suddenly squats on its haunches. This is an unnatural position. The hind limbs fall into such positions as suggest no notion of comfort or of design. They may cross one another, or they may be sprawled out on either side of the body. If the skin is pricked with the point of a pin, no sign of sensibility is usually elicited from the hind-quarters. Strike the prostrated members, and no evidence of pain follows. The posterior portions of the body are temporarily dead. Do not fuss about the horse; allow it to remain undisturbed where it has fallen. Loosen the harness; remove the shafts; procure some water, and allay its parching thirst. After a short space, the quadruped may get up of its own accord. No time has been lost; and disease has not been aggravated by needless torture. When the creature rises, the fit has passed; but the recovery cannot then be pronounced complete. He would, certainly, brave "an accident" who should essay to drive a horse but recently recovered from an attack of "kidney-dropping," though this hazard may be frequently incurred with apparent impunity.

To determine whether any disease of the spine is the cause of this affection, the investigator takes his position close to the quadruped, and runs the forefinger and thumb gently down the

center of the back. This action is repeated several times, additional force being brought to bear with each succeeding trial, until the whole strength of the operator is exerted. If, upon pressure being made on any particular spot, the ears are laid upon the neck, or the crest is suddenly elevated, the fact must be noted. The trial should be renewed, and if the like symptoms be elicited, the conclusion naturally is, that the seat of injury lies immediately under or very near the place indicated. This point being ascertained, the operator puts a hand on either side of the tender part, and casts his full weight suddenly upon the spine. Horses, under the sudden pang thus produced, have shrieked in agony. Generally, animals crouch under the torture, and burst forth into copious perspiration. The affair is thus decided. The spine has been injured, and the spinal cord which it sheathes is also involved in the lesion. Some-



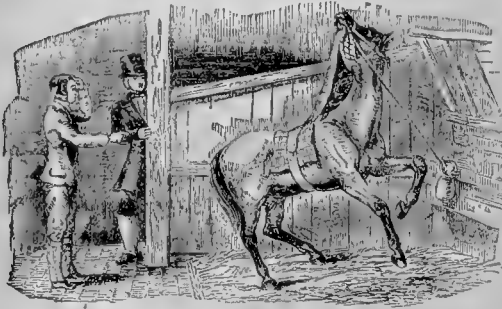
TEST ALONG THE SPINE.

times the animal entirely recovers; the trouble being caused by displacement or by such a partial fracture as rest will enable nature to surmount. In any case the horse is not "to blame."

Chink in the Back.—One of the bones of the spine may have been loosened, in consequence of the ligaments being overstrained; the animal has been abused in some manner. The ligaments are acutely painful; though no visual disorder may be observable to the post-mortem examiner, nevertheless the slightest weakness in such a structure may, during life, occasion the severest agony. The bone is not fractured; but one of the vertebræ, through the leverage of its superior spinous process, may have been wrenched slightly to one side. This may not affect the appearance of the quadruped; neither may it elicit signs of pain when the weight is evenly seated upon the back; therefore, only during the act of mounting, the drag then being entirely to one side, it occasions the most poignant anguish. The horse cannot explain its sensations verbally, nor appeal to the forbearance of its master. Its ailments are entirely subjected to the merciful consideration of man. Its actions are always

liable to be misconstrued; the effects of torture are frequently confounded with the exhibitions of "vice." Thus, a creature with the ligaments of the back strained, is always condemned as an inveterate kicker; because the drag, produced by the weight of the rider resting on one stirrup, occasions so sharp an agony as alarms the quadruped, and naturally excites a determination to repel some imaginary enemy. The seat of the saddle, however, is no sooner attained than composure is restored. When the rider is once fairly on the back, the steed re-assumes its natural docility and obedience. That circumstance has induced some thoughtful horsemen to change the habit and try the effect of mounting upon the wrong side; this has usually, for a certain time, been attended with perfect success; but the custom, after a time, has seemed to involve the sound ligaments, when the kicking has been renewed. A horse which kicks in the way described, should always be transferred to harness work.

Tearing the Clothing.—Stabled horses often are the victims of an acutely sensitive condition of



TEARING THE CLOTHING.

the skin. There is no tenderness displayed when the hand is laid upon the body. The coat looks well. Scurf is not developed in increased quantity. The hair does not prove loose or fall off. The animal feeds well, and seems in the highest possible condition. Nevertheless, it may acutely suffer, especially during spring and autumn. It may even be irritated by the provocation to gnaw large patches from the sensitive covering of the body; but the more common form of the disease urges it to destroy the heavy rug in which stable attendants are fond of wrapping their charges, before quitting them for the night. No sooner is the quadruped clothed up, than it begins to fidget. Its legs are in almost perpetual motion, and as soon as it is alone, it commences to tear off the hateful clothing. Large portions are seized between the teeth, and rent off with an energy almost madness. Nor is the fever which actuates the horse to be pacified, so long as a vestige of the covering remains to be removed.

The passion seems to be very engrossing while it exists; for, during the period, anybody may enter the building, and even approach the irritated quadruped, without his presence being observed. But, the feat being ended, the creature looks around, seems to recover quiet, nibbles different portions of its coat, licks the coolest parts of its manger, being evidently thirsty, and ultimately lies down, apparently well satisfied with its performance.

For an animal that destroys its rugs, refuse all further supply. Attend to the food, after the method already advised; next anoint the body with glycerine and rosewater, subsequently employing a hay wisp regularly night and morning. Place the animal in a cool, loose box, and, if possible, leave the window and half the door open. Give daily one ounce of liquor arsenicalis, in a pint of cold water, with one quart of good ale.

Shying and Swerving.—In the treatment of shying, it is of great importance to distinguish between that which is the consequence of defective sight, and that which results from fear, or newness of objects, or from mere affectation or skittishness. For the first, every allowance must be made, and care must be taken that the fear of correction be not associated with the imagined existence of some terrifying object. The severe use of the whip and the spur cannot do good here; and are likely to aggravate the vice tenfold. A word, half encouraging and half scolding, with a gentle pressure of the heel, or a slight touch of the whip, will tell the horse that there was nothing to fear; and will give him confidence in his rider or driver on a future occasion. It should be remembered, however, that although a horse that shies from defective sight may be taught considerable reliance on his rider, he can never have the cause of the habit removed. We may artificially strengthen the human sight, but the horse's must be left to itself.

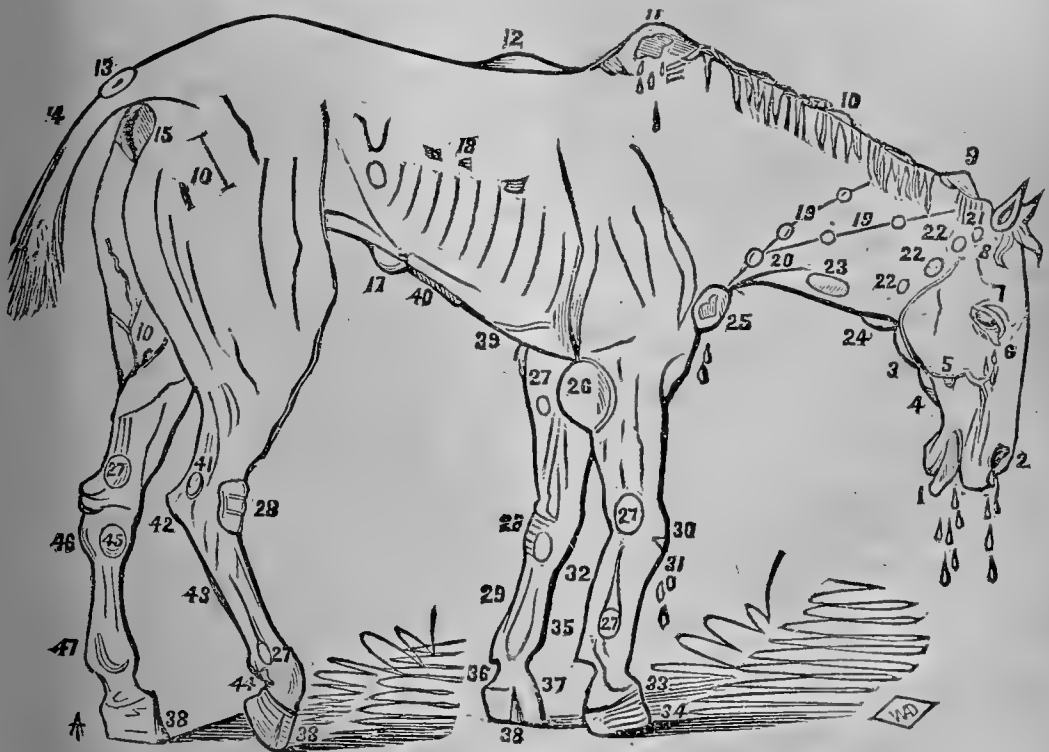
The shying, from skittishness or affectation is quite a different affair, and must be conquered. But how? Severity is out of place even here. If he is forced up to the object by dint of correction, the dread of punishment will afterwards be associated with that object, and on the next occasion, his startings will be more frequent and more dangerous. The way to cure him is to go on, turning as little as possible out of the road, giving the animal a harsh word or two, and a gentle touch with the whip or spur, and then taking no more notice of the matter. After a few times, whatever may have been the object which he chose to select as the pretended cause of affright, he will pass it almost without notice.

Mr. John Lawrence says: "These animals generally fix on some particular shying butt: for

example, I recollect having, at different periods, three hacks, all very powerful; the one made choice of a wind-mill for the object or butt, the other a tilted wagon, and the last a pig led in a string. It so happened, however, that I rode the two former when amiss from a violent cold, and they then paid no more attention to either wind-mills or tilted wagons than to any other objects, convincing me that their shying when in health and spirits was pure affectation; an affectation, however, which may be speedily united with obstinacy and vice. Let it be treated with marked displeasure, mingled with gentle, but decided firmness, and the habit will be of short endurance."

Rolling.—This is a very pleasant and perfectly safe amusement for a horse at grass, but cannot be indulged in the stable without the chance of his being dangerously entangled with the collar-rein, and being cast. Yet, although the horse is cast, and bruised and half-strangled, he will roll again on the following night, and continue to do so as long as he lives. The only remedy is not a very pleasant one to the horse, nor always quite safe; yet it must be had recourse to if the habit of rolling is inveterate. The horse should be tied with length enough of collar to lie down, but not to allow of his head resting on the ground; because, in order to roll over, a horse is obliged to place his head quite down upon the ground.

DIAGRAM SHOWING THE SEAT OF THE PRINCIPAL DISEASES OF THE HORSE.



- | | | |
|--|---|---|
| <p>1. Glanders.
2. Discharge from the nostrils.
3. Membrane.
4. Glandular swellings.
5. Caries and diseases of the jaw.
6. Fistula parotid duct.
7. Diseases of the eye.
8. Scars on the forehead and over the eyes.
9. Scars from old fontanels and brain-diseases.
10. Poll-evil.
11. Prurigo, or Mane-scab.
12. Fistulous withers.
13. Saddle-galls, Sitfasts, etc.
14. Fistulous tail.
15. Rat-tail.
16. Falling of the fundament.</p> | <p>16. Luxation of patella, or whirl-bone displaced.
17. Hernia, or Rupture.
18. Broken ribs.
19. Farcy.
20. Sores from constant bleeding.
21. Bridle-swellings.
22. Fistula and inflammation of parotid gland.
23. Phlebitis, or inflamed jugular vein.
24. Sore throat.
25. Tumors caused by collar.
26. Capped elbow, or Tumor.
27. Wind-galls.
28. Mallenders and Sallenders.
29. Splint.
30. Capped knee.
31. Broken knees and open joint.</p> | <p>32. Clap of the back sinews.
33. Ringbone.
34. Acute and chronic founder, or Ring-foot.
35. Grogginess.
36. Quittor.
37. Tread on coronet and over-reaches.
38. Sand-, Toe-, Cow- and Quarter-Cracks.
39. Girth swellings.
40. Wind-colic, Fret, Gripes or Belly-ache.
41. Thoroughpin.
42. Capped hocks.
43. Swelled or sprung sinews.
44. Scratches.
45. Spavin.
46. Curb.
47. Swollen legs.</p> |
|--|---|---|

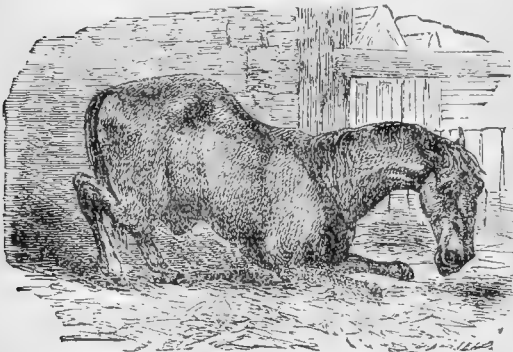
DISEASES AND ACCIDENTS, AND THEIR TREATMENT.

Abdominal Injuries.—*Ruptured Diaphragm* generally produces a soft cough; sitting on the haunches or leaning on the chest may or may not be present; the countenance is haggard.

Ruptured Spleen answers to the tests described under "Hemorrhage of the Liver."



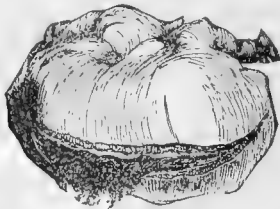
AN UNNATURAL ATTITUDE, INDICATIVE OF SOME ABDOMINAL INJURY.



A POSITION OFTEN ASSUMED BY THE HORSE SUFFERING FROM ABDOMINAL INJURY.

Ruptured Stomach is characterized by excessive colic, followed by tympanitis.

Intro-susception is always preceded by colic, and causes portions of the bowels to contract and



A RUPTURED STOMACH.

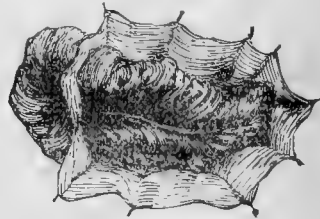
become small, firm and stiff. They are, while in that condition, by the peristaltic action pushed up other portions of the canal, which are of the natural size. The entrance of the contracted bowel acts upon the healthy one like a foreign

substance. Contractility is excited. The displaced and intruding bowel is grasped as by a vise, and the accident provokes its own continuance. Cure is hopeless while consciousness remains; the only hope is the administration of chloroform in full and long-continued doses: thereby to arrest vitality and give a chance for the release of the imprisoned bowel.



THE INTESTINE DIVIDED SO AS TO CLEARLY SHOW THE NATURE OF INTRO-SUSCEPTION.

Invagination is used to express the entrance of one entire division of the bowels within another. It is chiefly witnessed upon the large intestines; whereas intro-susception is mostly present upon the smaller bowels. The mesentery must be ruptured before such an accident can take place; but then the agony attendant upon the previous

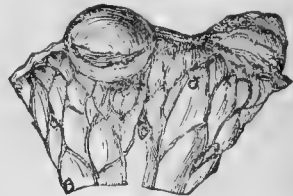


THE CÆCUM INVAGINATED WITHIN THE COLON, AND BLACK FROM INTENSE INFLAMMATION.

derangement is so powerful that it is impossible for the hugeness of this lesion to increase the violence of the torture; nor is there any sign by which so sad a catastrophe can be predicted.

Strangulation is not to be distinguished, during life, from invagination.

Calculus, or stone, may be present, either in the stomach or in the canal and remain there while the food passes over it, and no injury occasioned. But by any movement it is likely to be dislodged and thrown into the healthy channel. There it is firmly grasped with such force as to produce rupture of the intestine, and the hold is



THE SAC FORMED IN THE BOWEL; THIS THE CALCULUS HAS QUITTED, WHILE ANOTHER PORTION OF THE INTESTINE HAS SO FIRMLY GRASPED IT AS TO RUPTURE ITSELF.

only relaxed after inflammation has ended in mortification and death.

Abscess of the Brain.—*Cause.*—Some injury to the head.

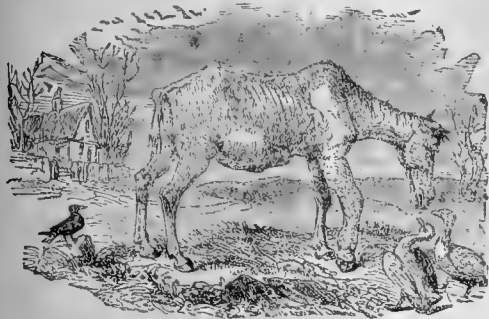
Symptoms.—Dullness; refusal to feed; a slight

oozing from a trivial injury upon the skull; prostration, and the animal, while on the ground, continues knocking the head violently against the earth until death ensues.

Treatment.—None of any service.

Acites, or Dropsy of the Abdomen.—*Cause.*—Chronic peritonitis.

Symptoms.—Pulse hard; head pendulous; food often spoiled; membranes pallid; mouth dry. Pressure on abdomen elicits a groan; turning in



A HORSE WITH ACITES, OR ABDOMINAL DROPSY.

the stall, a grunt. Want of spirit; constant lying down; restlessness; thirst; loss of appetite; weakness; thinness; enlarged abdomen; constipation and hide-bound. Small bags depend from the chest and belly; the sheath and one leg sometimes enlarge; the mane breaks off; the tail drops out. Purgation and death.

Treatment.—When the symptoms first appear give, night and morning, strychnia, $\frac{1}{2}$ grain, worked up to 1 grain; iodide of iron, $\frac{1}{2}$ drachm,



A HORSE SUFFERING FROM DRASTIC POISON.

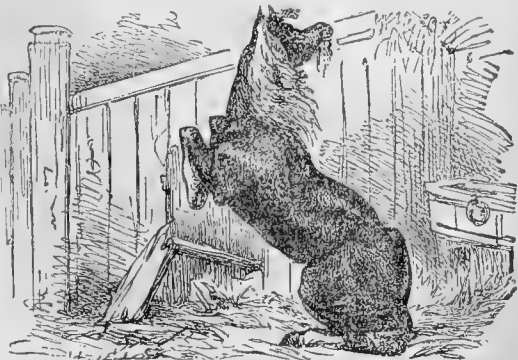
worked up to $1\frac{1}{2}$ drachm; extract of belladonna, 1 scruple; extract of gentian and powdered quassia, a little of each; apply small blisters, in rapid succession, upon the abdomen: but if the effusion is confirmed, a cure is hopeless.

Acute Dysentery.—*Cause.*—Some acrid substance taken into the stomach.

Symptoms.—Abdominal pain; violent purgation; the fæces become discolored, and water fetid; intermittent pulse; haggard countenance;

the position shows the seat of anguish. Perspiration, tympanitis, and death.

Treatment.—Give sulphuric ether, 1 ounce; laudanum, 3 ounces; liquor potassæ, $\frac{1}{2}$ ounce; powdered chalk, 1 ounce; tincture of catechu, 1 ounce; cold linseed tea, 1 pint. Repeat every 15 minutes. Cleanse the quarters; plait the tail; inject cold linseed tea. The irritating substance must be expelled before improvement can take place.

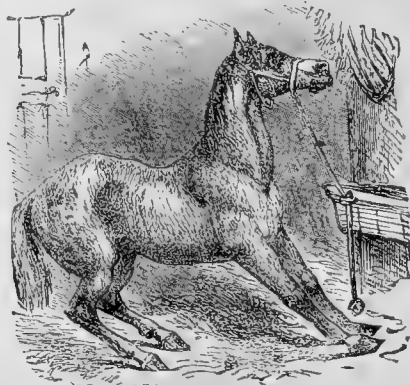


A HORSE SUFFERING FROM ACUTE GASTRITIS.

Acute Gastritis.—*Cause.*—Poison; generally given to improve the coat.

Symptoms.—Excessive pain, resembling fury.

Treatment.—Give, as often and as quickly as possible, the following drink: Sulphuric ether and laudanum, of each 3 ounces; carbonate of magnesia, soda or potash, 4 ounces; gruel (*quite cold*), 1 quart. Should the pulse be sinking, add to the drink carbonate of ammonia, 1 drachm.



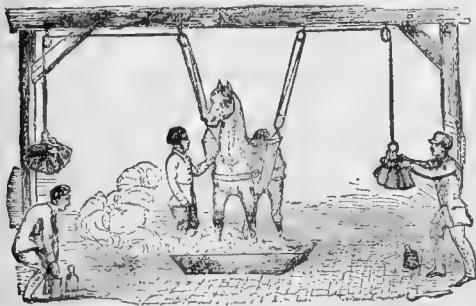
ACUTE LAMINITIS, OR FEVER IN THE FEET.

If corrosive sublimate is known to be the poison, one dozen raw eggs should be blended with each drench. If delirium be present, give the medicine as directed for tetanus, with the stomach-pump.

Acute Laminitis, or Fever in the Feet.—*Cause.*—Often man's brutality. Horses driven far and upon hard roads are exposed to the disorder.

Any stress long applied to the foot, as standing in the hold of a ship, may produce the affection.

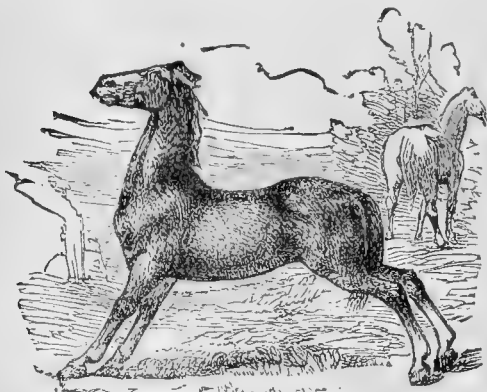
Symptoms.—The pace seems odd toward the end of the journey; but the horse is placed in the stable with plenty of food for the night. Next morning the animal is found all of a heap. Flesh quivering; eyes glaring; nostrils distended, and breath jerking; flanks tucked up; back roached; head erect; mouth closed; hind legs advanced under the belly; fore legs pushed



A HORSE IN SLINGS, WITH THE FOREFEET IN HOT WATER, FOR ACUTE LAMINITIS.

forward; fore feet resting upon the heels, and the limbs moved as though the horse were dancing upon hot irons.

Treatment.—Put on the slings in silence. To the end of the cords append weights. Soak the feet in warm water, in which a portion of alkali is dissolved. Cut out the nails from the softened horn. Before the shoes are removed give $\frac{1}{2}$ drachm of belladonna and 15 grains of digitalis,



THE POSITIONS ASSUMED BY HORSES HAVING ALBUMINOUS URINE.

and repeat the dose every half-hour until the symptoms abate. When the slings are up, open the jugular vein; abstract one quart of blood, and inject one pint of lukewarm water. Clothe the body; place thin gruel within reach, and watch for the first three nights.

Next morning give sulphuric ether and laudanum, of each 2 ounces, in a pint of water. Should the pastern arteries throb, open the veins and place the feet in warm water. While

the affection lasts, pursue these measures; and it is a bad symptom, though not a fatal one, if no improvement takes place in five days.

Albuminous Urine.—Cause.—Unknown.

Symptoms.—These consist of the positions assumed by the horse. The legs are either stretched out or the hind feet are brought under the body. Straddling gait, and much difficulty in turning within the stall. The urine is thick.

Treatment.—Bleed moderately; give a laxative, and apply mustard to the loins. As after-measures, perfect rest, attention to diet, and repeated doses of opium.

Aphtha.—Cause.—Unknown.

Symptoms.—Small swelling on the lips; larger swellings upon the tongue. As the disease pro-



APHTHA.

gresses, a clear liquid appears in each swelling. The bladders burst, crusts form, and the disease disappears.

Treatment.—Soft food, and the following wash for the mouth: Borax, 5 ounces; honey or treacle, 2 pints; water, 1 gallon. Mix.

Bog Spavin.—Cause.—Brutality of some kind.

Symptom.—A puffy swelling at the front of and at the upper part of the hock.

Treatment.—Pressure, maintained by means of an India-rubber bandage.

Bots.—Cause.—Turning out to grass.

Treatment.—No remedy. The following year the parasites will be ejected naturally.

Brain, Inflammation of the.—See *Phrenitis*.

Breaking Down.—Cause.—Violent exertion; generally when racing.

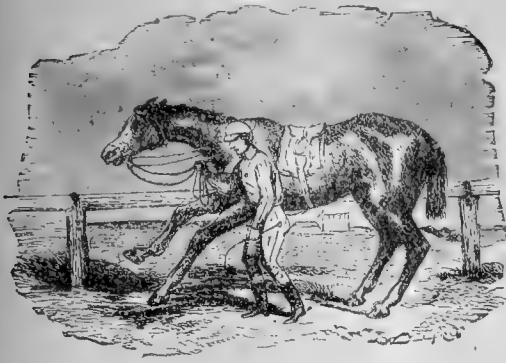
Symptoms.—The horse, when going, suddenly loses power to put one leg to the ground. The foot is turned upward; pain excessive; breathing quickened; pulse accelerated; appetite lost. In time these symptoms abate, but the leg is disabled for life.

Treatment.—Bleed and purge, or not, as the symptoms are severe. Place a linen bandage round the injury, and see that this is kept con-



BOG SPAVIN, OR DISTENSION OF THE PRINCIPAL SYNOVIAL MEMBRANE OF THE HOCK-JOINT.

stantly cold and wet; put on a high-heeled shoe, and leave the result to nature.



BREAKING DOWN.

Broken Knees.—*Causes.*—Terrifying a horse, or rendering alive only to fear. Pulling in the chin to the breast, or driving with a tight check-rein.

Symptoms.—The horse falls; the knee may only be slightly broken, but deeply contused. A slough must then take place, and open joint may result. Or the animal may fall, and, when down, be driven forward by the impetus of its motion. The knee is cut by the fall, and the skin of the knee may be forced back by the onward impulse. This skin will become dirty; but the removed integument will fly back on the animal's rising, thus forming a kind of bag containing and concealing foreign matter.

Treatment.—Procure a pail of milk-warm water and a large sponge. Dip the sponge in the pail, and squeeze out the water above the knee. Do not dab or sop the wound itself. The water flow-

at the end of that time all is going on well, the head may be released; but should the knee enlarge and become sensitive, while the animal refuses to put the foot to the ground, withdraw the seton; give no hay, but all the oats and beans that can be eaten, with two pots of stout each day. Place the quadruped in slings; apply the arnica lotion until a slough takes place; then resort to the chloride-of-zinc lotion, one scruple to the pint, and continue to use this as has been directed.

Broken Wind.—*Causes.*—Old age, prolonged work and bad food.

Symptoms.—Short, dry, hacking cough, caused by irritability of the larynx; ravenous appetite; insatiable thirst; abundant flatus. Dung half digested; belly pendulous; coat ragged; aspect dejected. Respiration is performed by a triple effort; inspiration is spasmodic and single; expiration is labored and double. The ribs first essay to expel the air from the lungs; these failing, the diaphragm and abdominal muscles take up the action. Broken wind can be concealed



HOW TO HEAR THE SOUND MADE WITHIN THE HORSE'S WIND-PIPE.

for a time by forcing the animal to swallow quantities of grease, tar or shot. A drink of water, however, will always reproduce the symptoms.

Treatment.—No cure. Relief alone is possible. Never give water before work. Four half-pails of water to be allowed in twenty-four hours. In each draught mingle $\frac{1}{2}$ ounce of phosphoric acid or $\frac{1}{2}$ drachm of sulphuric acid. Remove the bed in the day; muzzle at night; put rock-salt and chalk in the manger. Never push hard or take upon a very long journey.

Bronchitis.—*Causes.*—Riding far and fast; then leaving exposed, especially to the night air; neglect and constitutional liability.

Symptoms.—Appetite often not affected; sometimes is increased. A short cough, in the first instance; breathing only excited; legs warm; mouth moist; and nasal membrane merely deeper color during the early stage. When confirmed, the appetite is lost; the horse is averse to move; the cough is sore and suppressed; the breathing is audible; the membranes are scarlet; the mouth



THE HAIR RUFFLED AND THE CUTICLE SCRATCHED.



THE HAIR REMOVED AND THE TRUE SKIN EXPOSED.

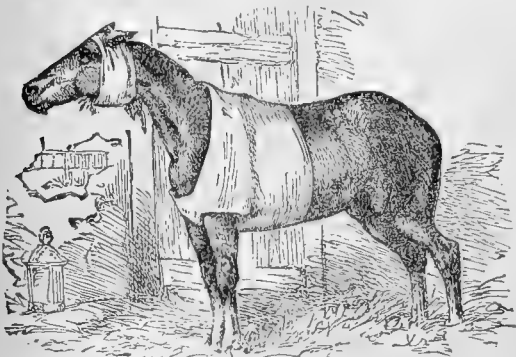


THE SKIN DESTROYED AND THE CELLULAR TISSUE INJURED.

ing over the knee will wash away every impurity. Then with a probe gently explore the bag. If small, make a puncture through the bottom of the bag; if large, insert a seton, and move it night and morning until good pus is secreted: then withdraw the seton. "Rack up" the horse's head, and get some cold water, to every quart of which add two ounces of tincture of arnica. Pour a little of this into a saucer, and dip a sponge into the liquid. Squeeze the sponge dry above the joint. Do this every half-hour for three and a half days, both by day and night. If

is hot and dry; the legs are cold; the body is of uneven temperatures.

Treatment.—Do not deplete. Place in a large, loose box; fill the place with steam; apply scalded hay to the throat; fix flannels wet with cold water to the back and side by means of a jacket. When the flannel becomes warm, change it. Do this for two hours. After that space the flannel may remain on, but must not become dry. Prepare $\frac{1}{2}$ pound of melted Burgundy pitch, and stir into it

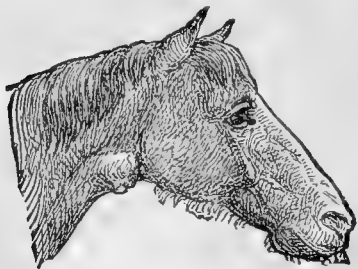


A HORSE DRESSED FOR BRONCHITIS.

2 ounces of powdered camphor, with $\frac{1}{2}$ drachm of powdered capsicums. Apply the mixture to the throat. To restore tone to the pulse, give, every half-hour, sulphuric ether and laudanum, of each 1 ounce; water, 1 pint. If no effect be produced by three of these drinks, substitute infusion of aconite, $\frac{1}{2}$ ounce; extract of belladonna, $\frac{1}{2}$ drachm, rubbed down in water, $\frac{1}{4}$ pint. When the pulse has recovered, resume the former physis, only adding $\frac{1}{2}$ drachm of belladonna to each dose. Support with gruel. Introduce food gradually; "chill" the water; be careful of hay, which must be thoroughly damped.

Bronchocele.—*Symptom.*—An enlargement on the side of the throat.

Treatment.—Give, night and morning: iodide



A HORSE WITH BRONCHOCELE.

of potassium, $\frac{1}{2}$ drachm; liquor potassæ, 1 drachm; distilled water, $\frac{1}{2}$ pint. Also, rub into the swelling the accompanying ointment: iodide of lead, 1 drachm, simple cerate, 1 ounce.

Bruise of the Sole.—*Cause.*—Treading on a stone or some projecting body.

Symptom.—Effusion of blood into the horny sole.

Treatment.—Cut away the stained horn, and shoe with leather.

Calculi.—*Causes.*—Unknown.

Renal Calculus.—A stone within the pelvis of the kidney.

Symptoms.—Urine purulent, thick, opaque, gritty or bloody; back roached. Pressure on the loins occasions shrinking; the arm in the rectum and the hand carried upward provoke alarm.

Treatment.—2 drachms of hydrochloric acid in every pail of water; but the result is doubtful.

Cystic Calculus signifies a stone in the cavity of the bladder.

Symptoms.—Same states of urine as in renal calculus. The water, when flowing, is suddenly stopped; every emission is followed by straining; the back is hollowed; the point of the penis is sometimes exposed; and, when going down hill, the animal often pulls up short.



A CERTAIN METHOD OF ASCERTAINING IF THERE BE CALCULUS IN THE BLADDER.

Treatment of Cystic Calculus.—Examine per rectum. An operation for the animal is imperative. When the stone is small, hydrochloric acid may be tried.

Symptoms of Urethral Calculus.—Suppression of urine; great suffering. If the urethral calculus is impacted in the exposed portion of the urethra, the passage is distended behind the stoppage.

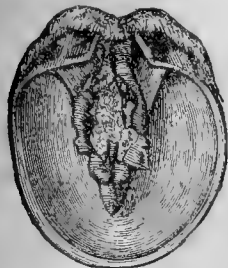
Treatment of Urethral Calculus.—Cut down upon and remove the substance.

Canker.—*Cause.*—Old horses, when "turned out" for life as pensioners. Aged and neglected animals will also exhibit the disease.

Symptoms.—Not much lameness. The disease commences at the cleft of the frog; a liquid issues from the part, more abundant and more offensive than in thrush; it often exudes from the commissures joining the sole to the frog. The horn first bulges out; then it flakes off, exposing a spongy and soft substance, which is fungoid horn. The fungoid horn is most abundant about the margin of the sole, and upon its surface it flakes off. This horn has no sensation. The

disease is difficult to eradicate when one fore-foot is involved. When all four feet are implicated, a cure is all but hopeless, and the treatment is certain to be slow and vexatious.

Treatment.—The stable must be large, clean and comfortable; the food of the best; allow liberal support; pare off the superficial fungoid horn, and so much of the deep-seated as can be detached. Apply to the diseased parts some of the following: Chloride of zinc, $\frac{1}{2}$ ounce; flour, 4 ounces. Put on the foot without water. To the sound hoof apply chloride of zinc, 4 grains; flour, 1 ounce. Cover the sound parts before the



THE PRIMARY ESTABLISHMENT OF CONFIRMED CANKER.

The horn turned back, so as to display the altered state of the frog, which indicates a severe attack of the disease.



THE SECOND STAGE OF CONFIRMED CANKER.

Showing the great abundance of fungoid horn secreted around the margin of the foot. No notice is purposely taken of the frog in this illustration.

cankered horn is dressed; tack on the shoe; pad well and firmly. When places appear to be in confirmed health, the following may be used: Chloride of zinc, 2 grains; flour, 1 ounce. At first, dress every second day; after a time, every third day, and give exercise as soon as possible.

Capped Elbow.—*Cause.*—Injury to the point of the elbow.

Symptom.—It is often of magnitude, and is liable to ulcerate and become sinuous.



A CAPPED ELBOW



CAPPED HOCK.

Treatment.—The same as capped hock.

Capped Hock.—*Cause.*—Any injury to the point of the hock.

Symptom.—A round swelling on the point of the hock, which, should the cause be repeated, often becomes of great size.

Treatment.—If small, set several men to hand-rub the tumor constantly for a few days. Should the capped hock be of magnitude, dissect out the enlargement, without puncturing it. Remove none of the pendulous skin. Treat the wound with the lotion of chloride of zinc—one grain to

the ounce of water—and it will heal after some weeks.

Capped Knee.—*Cause.*—The same as the previous affection.

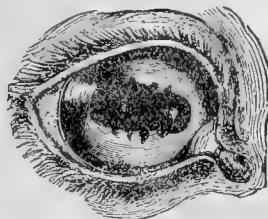
Symptom.—A soft tumor in front of the knee.

Treatment.—If let alone, it would burst and leave a permanent blemish. Draw the skin to one side, and with a lancet pierce the lower surface of the tumor. Treat the wound as an open joint.

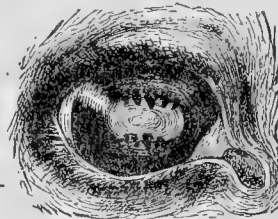
Cataract.—*Cause.*—Looking at white walls, or receiving external injuries. Specific ophthalmia generates a permanent cataract.

Symptoms.—When partial, shying; if total, white pupil and blindness.

Treatment.—Color the inside of the stable green, as cataract, when not total, sometimes disappears.



PARTIAL CATARACTS, OR SMALL WHITE SPECK WITHIN THE PUPIL OF THE EYE.



COMPLETE CATARACT.

Choking.—*Causes.*—Something impacted in the gullet, either high up or low down.

Symptoms—*High Choke.*—Raised head; saliva; discharge from the nostrils; inflamed eyes; haggard countenance; audible breathing; the muscles of neck tetanic; the flanks heave; the fore feet paw and stamp; the hind legs crouch and dance; perspiration; agony excessive. *Low Choke.*—The animal ceases to feed; water returns by the nostrils; countenance expresses anguish; saliva and nasal discharge; noisy breathing; roached back; tucked-up flanks; the horse stands as though desirous of elevating the quarters.

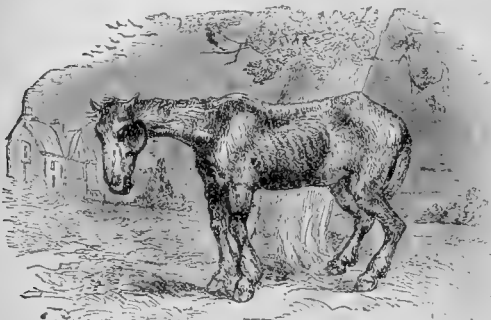
Treatment.—*Make haste when high choke is present.* Make a hole in the windpipe to relieve the breathing; insert the balling-iron, or, with a hook extemporized out of any wire, endeavor to remove the substance from the throat. If the choking body is too firmly lodged to be thus removed, sulphuric ether must be inhaled to relax the spasm. *Low choke is seldom fatal before the*

expiration of three days. Give $\frac{1}{2}$ pint of oil every hour; in the intermediate half-hours give sulphuric ether, 2 ounces; laudanum, 2 ounces; water, $\frac{1}{2}$ pint; and use the probang after every dose of the last medicine. Should these be returned, cause chloroform to be inhaled; then insert the probang, and, by steady pressure, drive the substance forward.

Subsequent to the removal of impactment feed with caution.

Chronic Dysentery.—*Cause.*—Not well understood; generally attacks old horses belonging to peunurious masters.

Symptoms.—Purging without excitement, always upon drinking cold water; violent straining; belly enlarges; flesh wastes; bones protrude; skin hide-bound; membranes pallid; weakness; perspiration; standing in one place for hours. At last the eyes assume a sleepy, pathetic expression; the head is slowly turned toward the flanks; remains fixed for some minutes; the horse only moves when the bowels are about to act; colic; death.

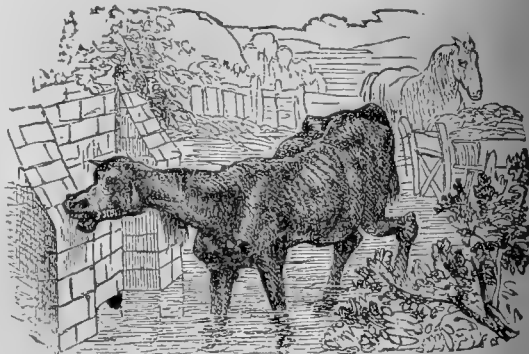


A HORSE SUFFERING UNDER CHRONIC DYSENTERY.

Treatment.—Give, thrice daily: Crude opium, $\frac{1}{2}$ ounce; liquor potassæ, 1 ounce; chalk, 1 ounce; tincture of allspice, 1 ounce; alum, $\frac{1}{2}$ ounce; ale, 1 quart. Should the horse belong to a generous master, give one of the following drinks thrice daily, upon the symptoms being confirmed: Sulphuric ether, 1 ounce; laudanum, 3 ounces; liquor potassæ, $\frac{1}{2}$ ounce; powdered chalk, 1 ounce; tincture of catechu, 1 ounce; cold linseed tea, 1 pint. Or, chloroform, $\frac{1}{2}$ ounce; extract of belladonna, $\frac{1}{2}$ drachm; carbonate of ammonia, 1 drachm; powdered camphor, $\frac{1}{2}$ drachm; tincture of oak-bark, 1 ounce; cold linseed tea, 1 pint. Feed lightly; dress frequently; give a good bed and a roomy lodging.

Chronic Gastritis.—*Symptoms.*—Irregularity of bowels and appetite; pallid membranes; mouth cold; a dry cough; tainted breath; sunken eye; catching respiration; pendulous belly; ragged coat, and emaciation. Sweating on the slightest exertion; eating wood-work or bricks and mortar.

Treatment.—Do not purge; administer bitters, sedatives an alkalies. Give powdered nuxvomica, 1 scruple; carbonate of potash, 1 drachm; extract of belladonna, $\frac{1}{2}$ drachm; extract of gentian and powdered quassia, of each a sufficiency. Or give strychnia, $\frac{1}{2}$ grain; bicarbonate of ammonia, 1 drachm; extract of belladonna, $\frac{1}{2}$ drachm; sulphate of zinc, $\frac{1}{2}$ drachm; extract of gentian and powdered quassia, of each a sufficiency. Give one ball night and morning. When these balls seem to have lost their power, give $\frac{1}{2}$ ounce each of liquor arsenicalis and tincture of



A HORSE WITH CHRONIC GASTRITIS INDULGING ITS MORBID APPETITE.

ipecacuanha, with 1 ounce of muriated tincture of iron and laudanum, in a pint of water; damp the food; sprinkle magnesia on it. As the strength improves, give sulphuric ether, 1 ounce, and water, 1 pint, daily. Ultimately change that for a quart of ale or stout daily.

Chronic Hepatitis.—*Cause.*—Too good food and too little work.

Symptoms.—Cold mouth; pallid membranes; white of eyes ghastly, displaying a yellow tinge; looks toward the right side; the right side may be tender for a long time, with generally repeated attacks of this nature, although the horse may perish with the first fit.

Treatment.—Hold up the head; and if the horse staggers, there is hemorrhage from the liver. Give sufficient nutritious food, but only enough, plenty of labor, and the following physic: Iodide of potassium, 2 ounces; liquor potassæ, 1 quart. Dose, night and morning, two tablespoonfuls in a pint of water.

Clap of the Back Sinews.—*Cause.*—Extra exertion.

Symptoms.—The maimed limb is flexed; the toe rests upon the ground. In a short space a tumor appears; it is small, hot, soft and tender, but soon grows hard. Great pain, but attended with few constitutional symptoms.

Treatment.—Administer physic, and bleed gently; then give a few doses of febrifuge medicine, but go no further than to reduce the pulse to fifty-five degrees. Put a linen bandage on the leg; keep this constantly wet until the primary

symptoms abate. Cut grass for food while fever exists; continue the cold water till recovery is



THE EARLIEST SYMPTOM OF CLAP OF THE BACK SINES, OR SEVERE SPRAIN OF THE TENDON.



THE BLEMISH LEFT BY CLAP OF THE BACK SINES.

confirmed. The horse will not be fit to work for many months.

Cold.—If mild, a few mashes, an extra rug and a slight rest generally accomplish a cure.

Symptoms of severe cold are dullness; a rough coat; the body of different temperatures; the nasal membrane deep scarlet, or of a leaden color; the appetite is lost; simple ophthalmia; tears; the sinuses are clogged, and a discharge from the nose appears.

Treatment.—Give no active medicine. Apply the steaming nose-bag six times daily; allow cut grass and mashes for food, with gruel for drink. If weak, present three feeds of crushed and scalded oats and beans daily, with a pot of stout morning and evening. Good nursing, with pure air, warmth, and not even exercise, till the dis-



A HORSE'S HEAD EXHIBITING A COLD.

ease abates, are of more importance than "doctor's stuff" in a case of severe cold. Cold, however, often ushers in other and more dangerous diseases.

Congestion in the Field.—*Cause.*—Riding a horse when out of condition.

Symptoms.—The horse, from exhaustion, reels and falls. The body is clammy cold; the breathing is labored; every vein is turgid.

Treatment.—Bleed, if possible; cover the body; lead gently to the nearest stable; keep

hot rugs upon the animal; bandage the legs and hood the neck; warm the place, either by a fire or, tubs full of hot water. Give quietly, every half-hour, 1 ounce of sulphuric ether, $\frac{1}{2}$ ounce of laudanum, $\frac{1}{2}$ pint of cold water. Beat up 2 ounces of turpentine with the yolk of an egg; mix it with $\frac{1}{2}$ pint of water, and repeat the dose at the times stated. Allow an ample bed, and place a pail of gruel within easy reach of the horse. Do not leave the animal for thirty hours, as in that time its fate will be decided.

Congestion in the Stable.—*Cause.*—A debilitated, fat horse, unused to work, being driven fast with a heavy load.

Symptoms.—Hanging head; food not glanced at; blowing; artery gorged and round; pulse feeble; cold and partial perspirations; feet cold; eye fixed; hearing lost; and the attitude motionless.

Treatment.—Give immediately 2 ounces each of sulphuric ether and of laudanum in a pint of cold water. Give the drink with every caution. In ten minutes repeat the medicine, if necessary. Wait twenty minutes, and give another drink, if requisite; more are seldom needed. Take away all solid food, and allow gruel for the remainder of the day.

Corns.—*Cause.*—In a flat foot, the heels of the coffin-bone squeeze the sensitive sole by pressing

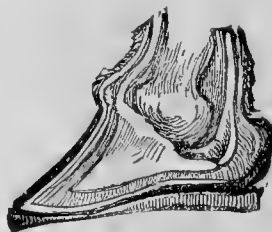


DIAGRAM.

Showing the position of the hindermost part of the coffin-bone when in a passive state; also portraying the shoe in the fleshy or flat foot.



DIAGRAM.

Illustrating the relative positions of the wings of the coffin-bone, and the thick, concave horny sole of the contracted foot when not in motion.

it against the shoe. In a contracted foot, the sensitive sole is squeezed between the wings of the coffin-bone and the thick horny sole. A

bruise results; blood is effused; and the stain of this left upon the horny sole—generally upon the inner side and anterior to the bars—constitutes a horse's corn, which is mostly found on the fore-feet.

Symptoms.—If the stain is dark, and is to be removed with the knife, this indicates that a corn was there, but no longer exists. The smallest stain of bright scarlet testifies to the existence of a new and present corn. Corns are of four kinds—the old, the new, the sappy and the suppurative. The old and new are produced by the blood, and are judged by the scarlet or dark-colored stain. The old is generally near the surface, the new is commonly deep seated. The sappy is when the bruise is only heavy enough to effuse serum. The new corn alone produces lameness. The suppurating corn may start up from either of the others receiving additional injury. It causes intense pain and produces acute lameness.

Treatment.—Cut out the stain. If a suppurating corn, place the foot in a poultice, after having opened the abscess. Then, the horn being softened, cut away all the sole which has been released by the pus from its attachment to the secreting surface. Tack on an old shoe, and dress with the solution of the chloride of zinc, 1 grain to the ounce. Afterward shoe with leather, and employ stop-



THE POSTERIOR OF A HORSE'S FOOT SHOD WITH LEATHER.

The central angular mark indicates the place into which the liquid stopping should be poured.

ping to render the horn plastic.

Cough.—*Causes.*—Foul stables; hot stables; coarse, dusty provender; rank bedding; irregular work; while the affection may attend many diseases.

Treatment.—Crush the oats; damp the hay; give gruel or linseed tea for drink. Clothe warmly, and give, thrice daily, $\frac{1}{2}$ pint of the following in a tumbler of water: Extract of belladonna, 1 drachm, rubbed down in a pint of cold water; tincture of squills, 10 ounces; tincture of ipecacuanha, 8 ounces. No change ensuing, next try Barbadoes or common tar, $\frac{1}{2}$ ounce; calomel, 5 grains; linseed meal, a sufficiency. Make into a ball, and give one night and morning. This being attended with no improvement, employ powdered aloes, 1 drachm; balsam of copaiba, 3 drachms; cantharides, 3 grains; common mass, a sufficiency. Mix, and give every morning.

A daily bundle of cut grass is good in the spring of the year. A lump of rock-salt may be beneficial. If the animal eats the litter, muzzle it: Roots are good. Moisten the hay; and, above all things, attend to the ventilation of the stable.

Cracked Heels.—*Cause.*—Cutting the hair from the heels, and turning into a straw-yard during winter.

Symptoms.—Thickened skin; cracks; and sometimes ulceration.

Treatment.—Wash; dry thoroughly; apply the following wash: Animal glycerine, $\frac{1}{2}$ pint; chloride of zinc, 2 drachms; strong solution of oak-bark, 1 pint. Mix. If ulceration has commenced, rest the horse. Give a few bran mashes or a little cut grass to open the bowels. Use the next wash: Animal glycerine, or phosphoric acid, 2 ounces; permanganate of potash or creosote, $\frac{1}{2}$ ounce; water, 3 ounces. Apply six times daily. Give a drink each day composed of liquor arsenicalis, $\frac{1}{2}$ ounce; tincture of muriate of iron, 1 ounce; water, 1 pint.

Crib-Biting.—*Cause.*—Sameness of food and unhealthy stables, or indigestion.

Symptoms.—Placing the upper incisors against some support, and, with some effort, emitting a little wind.

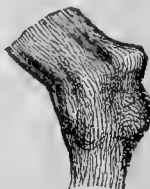
Treatment.—Place a lump of rock-salt in the manger; if that is not successful, add a lump of chalk. Then damp the food, and sprinkle magnesia upon it, and mingle a handful of ground oak-bark with each feed of corn. Purify the ventilation of the stable before these remedies are applied.

Curb.—*Causes.*—Galloping on uneven ground; wrenching the limb; prancing and leaping.

Symptom.—A bulging out at the posterior of



THE HEEL OF A HORSE IN A CRACKED CONDITION.



A CURB.



AN INDIA-RUBBER BANDAGE, FOR KEEPING WET CLOTHS UPON A CURB.

the hock, accompanied by heat and pain, often by lameness.

Treatment.—Rest the animal. Put on an India-rubber bandage, and under it a folded cloth. Keep the cloth wet and cool with cold water. When all inflammation has disappeared, blister the hock.

Cystitis, or, Inflammation of the Bladder.—*Causes.*—Kicks and blows under the flank; abuse of medicine, and bad food; with the provocatives generally of nephritis.

Symptoms.—Those common to pain and inflammation. Urine, however, affords the principal indication. At first, it is at intervals jerked forth in small quantities. Ultimately it flows forth constantly drop by drop. Press the flank, which, should cystitis be present, will call forth resistance.

Treatment.—Give scruple doses of aconite, should the pulse be excited; the same of belladonna, should pain be excessive; and calomel with opium, to arrest the disease. Place under the belly, by means of a rug; a cloth soaked with strong liquor ammonia diluted with six times its bulk of water. Or apply a rug dipped into hot water or loaded with cold water; change when either becomes warm.

Diabetes Insipidus, or Profuse Staling.—*Causes.*—Diuretic drugs or bad food.

Symptoms.—Weakness; loss of flesh; loss of condition.

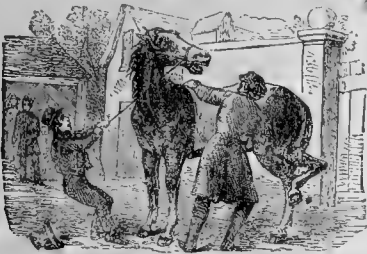
Treatment.—Do not take from the stable; keep a pail of linseed tea in the manger; give no grass or hay; groom well. Order a ball composed of iodide of iron, 1 drachm; honey and linseed meal, a sufficiency. Or a drink consisting of phosphoric acid, 1 ounce; water, 1 pint. Give the ball daily; the drink, at night and at morning.

Enteritis.—*Causes.*—Greatly conjectural. Prolonged colic may end in it. Constipation may induce it.



THE NOSE STRAINED VIOLENTLY UPWARD IS A GENERAL SYMPTOM OF ABDOMINAL IRRITATION.

Symptoms.—Dullness; heaviness; picks the food; shivers repeatedly; rolling; plunging; kicking, but more gently than in spasmodic colic;



THE TEST OF PRESSURE TO THE ABDOMEN FOR ENTERITIS.

quicken breathing; hot, dry mouth; wiry pulse. Pressure to the abdomen gives pain. Insert the arm up the anus; if the intestines are very hot, all is confirmed.

Treatment.—Extract 1 quart of blood from the jugular, and inject into the vein 1 pint of water at a blood heat. Give aconite in powder, $\frac{1}{2}$ drachm; sulphuric ether, 3 ounces; laudanum, 3 ounces; extract of belladonna, 1 drachm (rubbed down in cold water, $1\frac{1}{2}$ pints). As the pulse changes, withdraw the aconite; as the pain subsides, discontinue the belladonna. The other ingredients may be diminished as the horse appears to be more comfortable. Should the pain linger after the administration of the eighth drink, apply an ammoniacal blister. Sprinkle on the tongue, if any symptoms declare the disease vanquished but not fled, every second hour, calomel, $\frac{1}{2}$ drachm; opium, 1 drachm. Feed very carefully upon recovery, avoiding all things purgative or harsh to the bowels.

Epizooty, or Epizootic. See *Influenza*.

Excoriated Angles of the Mouth.—*Cause.*—Abuse of the reins.

Treatment.—Apply the following lotion to the part: Chloride of zinc, 2 scruples; essence of anise-seed, 2 drachms; water, 2 pints.

False Quarter.—*Cause.*—Injury to the coronet, producing an absence of the secreting coronet of the crust from the hoof.

Symptoms.—No lameness, but weakness of the foot. The soft horn of the laminae, being exposed, is apt to crack. Bleeding ensues. Sometimes granulations sprout when the pain and the lameness are most acute.

Treatment.—In cases of crack and granulations, treat as is advised for sandcrack. Put on a bar-shoe, with a clip on each side of the false quarter. Pare down the edges of the crack, and ease off the point of bearing on the false quarter. A piece of gutta-percha, fastened over the false quarter, has done good.

Farcy.—*Causes.*—Excessive labor, poor food and bad lodging, with old age.



FARCY ON THE INSIDE OF THE HORSE'S TRIGH, WHERE THE SKIN IS THIN AND THE HAIR ALMOST ABSENT.



A PORTION OF SKIN, TAKEN FROM A FARCYED HORSE, INJECTED WITH MERCURY.

Symptoms.—Inflammation of the superficial absorbents. Lumps appear on various parts. If

these lumps are opened, healthy matter is released; but the place soon becomes a foul ulcer, from which bunches of fungoid granulations sprout. From the lumps may be traced little cords leading to other swellings. The appetite fails, or else it is voracious. Matter may be squeezed through the skin. Thirst is torturing. At length glanders breaks forth, and the animal dies. There is a smaller kind of farcy called button-farcy; the smaller sort is the more virulent of the two.

Cure.—There is no known cure for the disease.

Fistulous Parotid Duct.—The parotid duct is the tube by which the saliva secreted by the gland is, during the act of mastication, conveyed into the mouth and mingled with the food. The parotid gland lies at the spot where the neck joins the jaw; within the interior of that body numerous fine hollow vessels connect and unite. These at each junction become larger and fewer in number, till at length they all terminate in one channel.

Causes.—Hay-seed or other substances getting



THE PAROTID DUCT DISTENDED BY A SALIVARY CALCULUS.

into the mouth of the duct during mastication. Stones being formed within the canal. The stable-fork in the hand of an intemperate groom.

Symptoms.—The duct greatly enlarges behind the obstacle, which, becoming swollen, prevents the secretion from entering the mouth. Great agony is occasioned by every mouthful masticated. The duct bursts, and a fistulous opening is established, through which the saliva jerks at each motion of the jaw. From the absence of a secretion important to digestion, the flesh wastes, and the animal soon assumes a miserable appearance.

Treatment.—Make an adhesive fluid with gum mastic and spirits of wine, or with India-rubber and sulphuric ether. When the horse is not feeding, pare the hardened edges from the wound; cover the orifice with a piece of strained India-rubber; over this put a layer of cotton; fasten one end to the horse's cheek by means of the adhesive fluid; that having dried, fasten the other end tightly down. Place other layers of cotton over this, allowing each layer to cross the

other, and fastening all to the cheek. Fasten the head to the pillar-reins; allow the horse to remain till the cotton falls off, and give only gruel for food. Put tan under the feet; and should the first trial not succeed, repeat it.

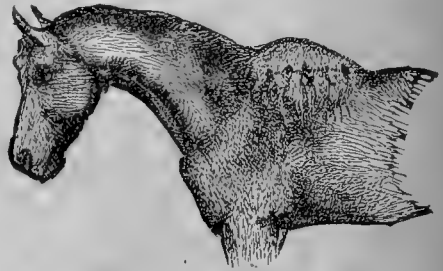
Fistulous Withers.—*Cause.*—External injury, generally by a lady's saddle, which bruises one of the bursæ placed above the withers.



THE SLIGHT ENLARGEMENT WHICH, BADLY TREATED OR UNATTENDED TO, MAY END IN FISTULOUS WITHERS.

Symptoms.—When first done, a small round swelling appears on the off side. If this is neglected, the place enlarges, and numerous holes burst out, which are the mouths of so many fistulous pipes.

Treatment.—In the early stage, open the tumor and divide it. Touch the interior with lunar caustic; keep the wound moist with the chloride-of-zinc lotion, one grain to the ounce of water, and cover it with a cloth dipped in a solution of



A HORSE WITH FISTULOUS WITHERS IN THE WORST STAGE.

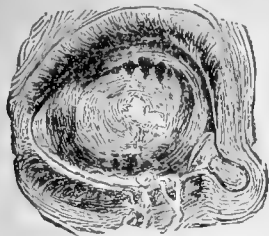
tar. If the sinuses are established, make one cut to embrace as many as possible. Clean out the corruption. Scrape or cut off any black or white bone which may be exposed. Cover with a cloth, and keep wet with the solution of chloride of zinc. Should there exist a long sinus leading from the withers to the elbow, insert a seton by means of the guarded seton-needle. This seton should be withdrawn as soon as a stream of creamy pus is emitted.

Fungoid Tumors in the Eye.—*Cause.*—Unknown.

Symptoms.—Blindness; a yellow, metallic appearance to be seen in the eye.

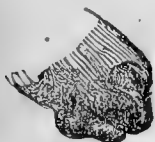
Treatment.—None of any service.

Glanders.—Cause.—Bad lodging, stimulating food, and excessive work operating upon young life.

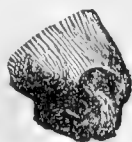


FUNGUS HÆMATOIDES, OR CANCEROUS GROWTHS WITHIN THE SUBSTANCE OF THE EYE.

Symptoms.—Staring coat; lungs or air-passages always affected; flesh fades; glands swell; spirits low; appetite bad. A lymphatic gland adheres



THE PRIMARY DISCHARGE OF GLANDERS. SIMPLY A SLIGHT WATERY DEFLUXION.

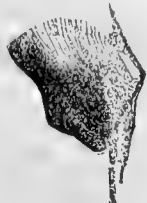


THE SECONDARY DISCHARGE. A THICK AND COPIOUS BUT STILL TRANSPARENT EXCRETION, CONTAINING PIECES AND THREADS OF MUCUS.

to the inside of the jaw; the membrane inside the nose ulcerates; a slight discharge from one nostril. This becomes thicker, and adheres to

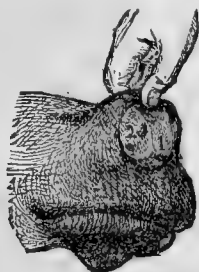


THE THIRD, OR SUPPURATIVE STAGE OF GLANDERS.



THE FOURTH, OR LAST STAGE OF GLANDERS.

the margin of the nostril, exhibiting white threads and bits of mucus; then it changes to a full stream of foul pus; next the nasal membrane



THE PROOF OF GLANDERS.

1. Termination of the lachrymal duct—a natural development.
2. A discolored membrane, disfigured by ulcerative patches.

grows dull and dropsical; the margins of the nostrils enlarge; the horse breathes with difficulty; the discharge turns discolored and abhor-

rent; farcy breaks forth, and the animal dies of suffocation.

Treatment.—There is no known cure. The contagion is dangerous to man and beast. Kill the animal as soon as you are certain it has glanders.

Grease — Causes.—Age; debility; excessive labor; neglect; filth. Cutting the hair off the heels; turning out to grass in the cold months.

Symptoms.—Scurfiness and itchiness of the legs. Rubbing the leg with the hoof of the opposite limb; hairs stand on end; moisture exudes, and hangs upon the hairs in drops. Smells abhorrently; lameness; cracks on the skin; swelling; ulceration; thin discharge; odor worse. Lameness increases; leg enlarges; granulations sprout in ragged bunches; their points harden and become like horn; pain excessive; horn of hoof grows long.



FIRST STAGE OF CONFIRMED GREASE EXUDATION.



SECOND STAGE OF CONFIRMED GREASE CRACKS.

Treatment.—Cut off all remaining hair. If hot and scurfy, cleanse with mild soap and hot, soft water; saturate a cloth with the following lotion: Animal glycerine, $\frac{1}{2}$ pint; chloride of zinc, $\frac{1}{2}$ ounce; water, 6 quarts. Lay it upon the leg. When this cloth becomes warm, remove it, and apply another, also wet with the lotion; thus continue applying cool cloths to the limb till the heat abates; afterward moisten the leg thrice daily. When cracks and ulceration are present, adopt the wet cloths; but subsequently use one of the following to the sores: Permanganate of potash or phosphoric acid, 1 pint; water, 6 quarts. Or chloride of zinc, 1 ounce; water, 1 gallon: employ thrice daily. If the granulations have sprouted, remove them with a knife, in three operations. Always place in a loose box. Feed liberally; allow old beans; give a handful of ground oak-bark with each feed of oats. Night and morning give liquor arsenicalis, 1 ounce; tincture of muriate of iron, $1\frac{1}{2}$ ounces; porter or stout, 1 quart; 1 pint for the dose. Chopped roots; speared wheat; hay tea; cut grass, and exercise are all good for grease.

Gutta Serena.—Cause.—Over-exertion.

Symptoms.—Fixed dilatation of the pupil; a

greenish hue of the eye; total blindness. Active ears; restless nostrils; head erect; high stepping; occasionally a rough coat in summer and a smooth coat in winter.

Treatment.—No remedy is possible.

Heart-Disease.—*Symptoms.*—Auscultation. The beat of the heart to be seen externally; haggard countenance; pulse feeble; heart throbs; the beat of the carotid artery is to be felt; the regurgitation in the jugular is to be seen. The appetite is sometimes ravenous—often fastidious; the breathing is not accelerated excepting during pain; lameness of one leg; dropsical swellings; stopping short when on a journey; averse to turn in the stall; noises; yawns; sighs. Death always unexpected. No treatment is of any use.

Hematuria, or Bloody Urine.—*Cause.*—Unknown.

Symptoms.—Discoloration of the fluid. When the bleeding is copious, breathing is oppressed; the pupils of the eyes are dilated. Pulse is lost; head is pendulous; membranes are pale and cold. Lifting up the head produces staggering. Back roached; flanks tucked up; legs wide apart.

Treatment.—Be gentle. Give acetate of lead, 2 drachms, in cold water, 1 pint; or as a ball, if one can be delivered. In a quarter of an hour repeat the dose, adding laudanum, 1 ounce, or powdered opium, 2 drachms. Repeat the physic till an ounce of acetate of lead has been given. Leave the horse undisturbed for two hours, if the symptoms justify delay. If not, dash pailfuls of cold water upon the loins from a height. Give copious injections of cold water. Pour $\frac{1}{2}$ pint of boiling water upon 4 drachms of ergot of rye. When cold, add laudanum, 1 ounce, and dilute acetic acid, 4 ounces. Give two of these drinks, and two cold enemas, of twenty minutes' duration. Suspend all treatment for eight hours, when the measures may be repeated.

Hide-Bound.—*Cause.*—Neglect, or turning into a straw-yard for the winter.

Treatment.—Liberal food, clean lodging, soft bed, healthy exercise and good grooming. Administer, daily, two drinks, composed of liquor arsenicalis, $\frac{1}{2}$ ounce; tincture of muriate of iron, 1 ounce; water, 1 pint. Mix, and give as one dose.

High-Blowing and Wheezing.—Habits which admit of no remedies.

Hydrophobia.—*Cause.*—Bite from a rabid dog or cat.

Symptoms.—The horse is constantly licking the bitten place. A morbid change takes place in the appetite. Eager thirst, but inability to drink, or spasm at the sound or sight of water is exhibited. Nervous excitability; voice and expression of countenance altered. More rarely the horse—when taken from the stable—appears well. While at work, it stops and threatens to fall.

Shivers violently, and is scarcely brought home when the savage stage commences. The latter



THE COUNTENANCE OF A HORSE WITH HYDROPHOBIA.

development consists in the utmost ferocity, blended with a most mischievous cunning, or a malicious pleasure in destruction.



THE DESTRUCTIVE IMPULSE OF HYDROPHOBIA.

Treatment.—No remedy known. Confine in a strong place, and shoot immediately.

Hydrothorax, or Dropsy of the Chest.—*Cause.*—Pleurisy; or inflammation of the membrane lining the chest.

Symptoms.—The horse is left very ill. The next morning the animal is looking better; the



REMOVING THE FLUID IN HYDROTHORAX.

pain has abated; the eye is more cheerful; but the flanks heave. Strike the chest while the person listens on the other side: a metallic ring follows; the pulse is lost at the jaw; the heart

seems to throb through water. The horse has hydrothorax.

Treatment.—The first thing is to draw off the fluid. A spot between the eighth and ninth ribs is chosen, and the skin is pulled back; a small slit through the skin is made; into that opening a fine trocar is driven. When there is no resistance felt, the thorax has been entered; the stilet is withdrawn and the water flows forth. Should the horse appear faint, withdraw the instrument, and in two hours again puncture the chest. Afterward the food must be prepared, and a ball administered night and morning, consisting of iodide of iron, 1 drachm; strychnia, $\frac{1}{2}$ grain; sulphate of zinc, $\frac{1}{4}$ drachm; extract of gentian and powdered quassia, a sufficiency.

Impediment in the Lachrymal Duct.—*Cause.*—A hay-seed, or other substance getting into and becoming swollen within the duct.

Symptoms.—Swollen lid and copious tears.

Treatment.—Inject, forcibly, a stream of water up the duct.

Inflammation of the Brain.—See *Phrenitis*.

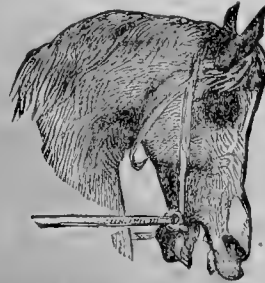
Influenza.—*Cause.*—Unknown; but suspected to be generated by close stables. Called also Epizooty, or the Epizootic.

Symptoms.—Weakness and stupidity; local swellings; heat and pain in the limbs. Loss of appetite; rapid wasting; every part of the body is diseased. Youth most exposed, but no age exempt. Spring-time the general season, but an attack may ensue at any period of the year. The following symptoms are somewhat uncertain: Pendulous head; short breath; inflamed membranes; swollen lips; dry mouth; enlarged eyelids; copious tears; sore throat; tucked-up flanks; compressed tail; filled legs; big joints; lameness and hot feet. Auscultation may detect a grating sound at the chest, or a noise like brickbats falling downstairs, within the windpipe. When the last is audible, there is always a copious discharge. Sometimes one foot is painful; purgation has been seen; but constipation is generally present, and the horse usually stands throughout the disease. Always suspect influenza when it is in the neighborhood, and the membranes are yellow or inflamed.

Treatment.—Move to a well-littered, warm, loose box. Suspend a pail of gruel from the wall; change the gruel thrice daily; sprinkle on the tongue, night and morning; calomel, 1 scruple; wash this down with sulphuric ether, 1 ounce; laudanum, 1 ounce; water, $\frac{1}{2}$ pint. If weakness increases, double the quantity of ether and of laudanum. When the pulse loses all wiry feeling, and the discharge becomes copious, give from the hand some bread, on which there is a little salt; when the cough appears, give a pot of stout daily. Beware of purgatives or active treatment.

Injuries to the Jaw.—*Causes.*—Pulling the snaffle; abuse of the bit; too tight a curb-chain.

Symptoms.—Discoloration before or behind the tush; bruise under the tongue or upon the roof of the mouth; tumor and bony growth upon the margin of the lower jaw.



THE SNAFFLE BEARING UPON THE LOWER JAW.

Treatment.—Cut upon the discoloration till the knife reaches the bone; if fetor is present, inject the chloride-of-zinc lotion; keep the wounds open, that the injured bone may come away.

Lacerated Eyelid.—*Causes.*—Nails in the gangway, or the horses snapping at each other.

Treatment.—Bathe with cold water till the bleeding ceases; allow the separated parts to remain until the divided edges are sticky; bring together with sutures; place the horse in the pillar-reins till the healing is perfected.

Lacerated Tongue.—*Causes.*—Sticking to a horse when giving physic; making a "chaw" of the halter-rope.

Treatment.—Insert no sutures; if the arteries are excised, cut off the hanging portion of the tongue; should the vessels have escaped, allow all to remain; feed on gruel and soft food; after every meal wash out the mouth with the solution ordered for aphtha, or with the chloride-of-zinc lotion.

Laminitis (Subacute).—*Causes.*—Age; long standing in the stable; over-work, and stinted diet.

Symptoms.—First noticed by the manner of going upon the heels of the forefeet.

Treatment.—Get into slings. Remove the shoes. Do not bleed. Give a quart of stout, night and morning. Allow two drinks per day, each consisting of 1 ounce of sulphuric ether and $\frac{1}{2}$ pint of water; $\frac{1}{2}$ drachm doses of belladonna, to allay pain; sound oats and old beans, both crushed, for food; water to be whitened; no hay. No limit to this food, but five feeds to be given if the horse will eat so much.

Laryngitis.—*Cause.*—Foul stables.

Symptoms.—Dullness; enlargement over the larynx; stiff neck; short and suppressed cough;



THE DEFORMITY WHICH ENSUES UPON DROPPING OF THE COFFIN-BONE.

breathing hurried and catching; pulse full; nasal membrane almost scarlet.

Treatment.—Give drachm doses of tincture of aconite, in wineglasses of water, every half-hour, to amend the pulse. Refrain from bleeding. Put on a steaming nose-bag, and keep it almost constantly applied, to amend the breathing. Fix some hay, soaked in boiling water, upon the throat, by means of an eight-tailed bandage. Give, very carefully, the following drink, thrice daily: Infusion of squills, 2 ounces; infusion of ipecacuanha, 2 ounces; infusion of aconite, $\frac{1}{2}$ ounce; extract of



STEAMING THE NOSE OF A HORSE WITH COLD.

belladonna, 1 drachm, rubbed down with a pint of warm water. Place in a cool, well-aired, thickly-littered, loose box; bandage the legs; clothe the body; give only gruel for food, changing it thrice daily. On improvement, a little moist food may be allowed. When improvement is confirmed, put a seton under the throat. Blister the throat; pick and damp the hay; sift, bruise and scald the oats. Employ no lowering agents.

Larva in the Skin.—*Causes.*—Turning out to grass. The fly lays its egg upon the hair, the warmth of the body hatches it, and the larva enters the skin. The next summer a tolerably large abscess is established, the insect occupying its center.

Treatment.—With a lancet open the abscess, and squeeze out the larva. Dab the wound with a lotion made of chloride of zinc, 1 grain; water, 1 ounce.

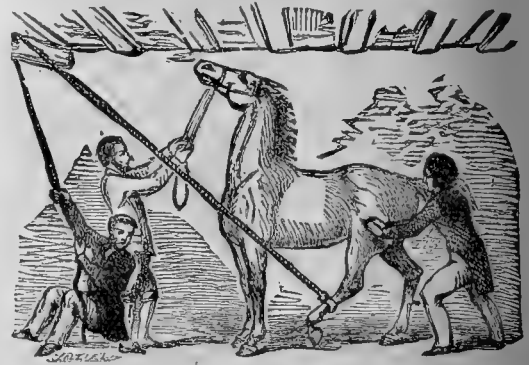
Lice.—*Causes.*—Filth and debility.

Treatment.—Rub the skin with some cheap oil or grease. Wash, and then look for other diseases, as hide-bound, mange, etc.

Luxation of the Patella.—*Cause.*—Bad food and constitutional weakness.

Symptoms.—The horse stops short, and has one of the hind legs extended backward. A swelling upon the outer side. The pastern is flexed, the

head raised, and the animal in great pain. In colts it will sometimes appear on the slightest cause.



THE MANNER OF RETURNING THE PATELLA OF AN ADULT ANIMAL.

Treatment.—For colts, any flurry may restore the bone; but feed well, to eradicate the weakness. For horses, get into a shed, and, throwing a rope one end of which has been fixed to the pastern, have the leg dragged forward while some one pushes the bone into its place. A man should be put to keep the bone in its situation for some hours. Give strengthening food, and do not use for six weeks subsequently.

Mallenders and Sallenders.—*Cause.*—Neglect.

Symptoms.—Scurf upon the seats of flexion; mallenders at the back of the knee, and sallenders at the front of the hock.

Treatment.—Cleanliness. Give the liquor-arsenicalis drink, recommended for grease. Change the groom. Rub the parts with this ointment: Animal glycerine, 1 ounce; mercurial ointment, 2 drachms; powdered camphor, 2 drachms; spermaceti, 1 ounce. If cracks appear, treat as though cracked heels were present.

Mange.—*Causes.*—Starvation; bad lodging and no grooming; turning out to grass.



A MANGY PIECE OF SKIN.

Symptoms.—Scurf about the hairs of the mane; the hair falls off in patches; the skin is corrugated; a few hairs remain upon the bare places, and these adhere firmly to the skin; scrubbing the body against posts; sores and crusts. To

test its presence, scratch the roots of the mane, and the horse will exhibit pleasure.

Treatment.—Place the horse in the sunshine, or in a heated house, for one hour; then whisk thoroughly, to remove scurf and scabs; then rub in the following liniment: Animal glycerine, 2 parts; oil of tar, 2 parts; oil of turpentine $\frac{1}{2}$ part; oil of juniper, $\frac{1}{2}$ part. Mix. Leave on for two days; wash; anoint again; wash and wash once more, always leaving the liniment on for two clear days.

Megrims.—*Cause.*—Unknown.

Symptoms.—The horse suddenly stops; shakes the head; strange stubbornness may be exhibited, followed by a desire to run into dangerous places. Then ensues insensibility, accompanied by convulsions.



THE EXPRESSION CHARACTERISTIC OF REPEATED ATTACKS OF MEGRIMS.

Treatment.—Throw up, on the first fit. Give a long rest, and try to amend the constitution.

Melanosis.—*Cause.*—Unknown. The disease only attacks gray horses which have become white.

Symptoms.—It appears as a lump of uncertain form, size and situation. The swelling, if cut into, discloses a cartilaginous structure, dotted here and there with black spots. Do not use the knife unless the swelling impede the usefulness, or should be peculiarly well placed for operation. Feel the tail. A pimple on the dock is an almost certain sign of melanosis, which disease affects the internal organs even more virulently than it attacks the external parts. As melanosis proceeds, all spirit departs, and the animal is at length destroyed as utterly useless.

Treatment.—Let the tumor alone. Forbid all use of the currycomb. Dress very long and very gently with the brush only. Twice a week anoint the body with animal glycerine, 1 part; rose-water, 2 parts.

Nasal Gleet.—*Causes.*—Decayed molar tooth; kicks from other horses; injuries to the frontal bones, or neglected catarrh.

Symptoms.—Distortion of the face; partial enlargement and softening of the facial bones; ir-

regular discharge of fetid pus from one nostril. The discharge is increased, or brought down by feeding off the ground, or by trotting fast.



INJECTING THE HEAD OF A HORSE FOR NASAL GLEET.

Treatment.—Surgical operation, with injection of a weak solution of chloride of zinc. Also give daily a ball composed of balsam of copaiba, $\frac{1}{2}$ ounce; powdered cantharides, 4 grains; cubebs, a sufficiency. If the foregoing should affect the urinary system, change it for $\frac{1}{2}$ -drachm doses of extract of belladonna, dissolved in a wineglass of



PART OF A HORSE'S HEAD WHICH HAS THE BONE TREPHINED SO AS TO ENABLE THE SURGEON TO EMPTY THE TURBINATED BONE. THE COURSE OF THE NERVES IS SHOWN.

water. Give these every fourth day, and on such occasions repeat the belladonna every hour.

Nasal Polypus.—*Symptoms.*—An enlarged nostril; a copious mucous discharge; signs of suffocation, if the free nostril be stopped; a cough generally forces down the growth.



A POLYPUS.



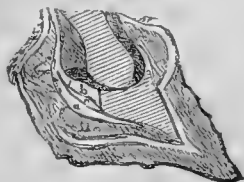
NASAL POLYPUS.

Treatment.—Surgical operation, which removes the tumor.

Navicular Disease.—*Causes.*—Frog pressure, and not shoeing with a leathern sole. The unprotected foot treads on a rolling stone, and navicular disease is the result.

Symptoms.—Acute lameness; this disappears, but may come again in six or nine months.

Acute lameness is then present for a longer time while the subsequent soundness is more short. Thus the disease progresses, till the horse is lame for life. The pain in one foot causes greater stress upon the sound leg, and from this cause both feet are ultimately affected. The foot is pointed in the stable. The bulk diminishes, while the hoof thickens and contracts. The horse, when trotting, takes short steps, and upon the toe, going groggily.



A DIAGRAM TO EXPLAIN THE SEAT OF NAVICULAR DISEASE.

- a. The perforans tendon running beneath the bone, and on which the bone reposes.
- b. The comparative size and relative situation of the navicular bone.
- c. The synovial sac which facilitates the motion of the bone on the tendon; upon the superior surface of this sac navicular disease is alone exhibited.

Treatment.—Feed liberally upon crushed oats and old beans. Soak the foot every other night in hot water. Afterward bandage the leg, fix on tips, and having smeared the horn with glycerine, put on a sponge-boot. Rest very long—six months in the first instance—and then give three months' agricultural employment. In bad cases resort to neurotomy, but do so upon the second attack of lameness; because



THE UPRIGHT PASTER AND HARD, UNYIELDING HOOF, INDICATIVE OF CONFIRMED NAVICULAR DISEASE.

continued disease disorganizes the internal structures of the hoof, and also occasions the sound foot to be attacked by navicular disease.

Nephritis, or Inflammation of the Kidneys.—*Causes.*—Bad provender, or niter in a mash, and long or fast work upon the following day.

Symptoms.—Hard, quick pulse; short breathing; pallid membranes; looking at the loins; depressed head; roached back; hind legs straddling; scanty urine; refusing to turn in the stall; and crouching under pressure on the loins. Subsequently, pus is voided with the water. If the urine has a fetid odor, if blood be present, if the pulse grows quicker, if pressure gives no pain, and if the perspiration has a urinous smell, death is near at hand. To be certain of nephritis, insert the arm up the rectum and move the hand toward the kidneys.

Treatment.—Rub mustard into the skin of the loins. Cover it over to prevent it becoming dry. Apply fresh sheepskins as soon as these can be procured. Inject warm linseed tea every hour.

A ball composed of Croton farina, 2 scruples; extract of belladonna, $\frac{1}{2}$ drachm; treacle and linseed meal, a sufficiency, should be given immediately; 1 scruple of calomel; 1 drachm of opium should be sprinkled on the tongue every hour. A pail of linseed tea may be placed in the manger. Feed on linseed tea, and mind the oats—when allowed—are very good. While the pain is acute, give, thrice daily, a ball composed of extract of belladonna, $\frac{1}{2}$ drachm; crude opium, 2 drachms; honey and linseed meal, of each a suf-



A CERTAIN TEST FOR INFLAMMATION OF THE KIDNEYS.

ficiency. When the pain is excessive, repeat the above ball every hour. Should the pulse increase and become wiry, a scruple of aconite should be thrown upon the tongue every half-hour until the artery softens, or the animal becomes affected with the drug.

No cure is to be expected; the disease may be arrested, but the kidney will be left in an irritable state.

Occult Spavin.—*Cause.*—Treading on a stone.

Symptoms.—Sudden lameness, which never departs, but in the end becomes very bad. The disease is always worse after work. The foot is without disease, and the leg is not hot or painful; yet the lameness continues and gets worse. The leg is snatched up in the walk, and the foot is not turned outward.

Treatment.—Get the horse into slings. Rub the front of the hock with an embrocation composed of compound soap liniment, 16 ounces; tincture of cantharides, liquor ammonia and laudanum, of each two ounces. After the joint is embrocated, wrap it round with flannel, held upon the hock with elastic rings. Give three feeds of corn, a few old beans and sweet hay daily. After the horse bears upon the diseased limb, allow the slings to remain for three months. Three months after it has left the slings, put to gentle work, but the labor must not be exhausting. The work must not be full till six months have elapsed. Keep the bowels regular with bran mashes. If all treatment fail, cast the horse; retract the injured limb; make a small puncture, and inject one ounce of dilute spirits of wine in which half a drachm of iodine has been

dissolved. Place the horse in slings, and apply cold water to the hock. When the pulse is quiet, feed very liberally.

Open Synovial Cavities.—*Causes.*—The pride of gentility, which apes what is not, and tries to pass off a horse with a ewe neck for an animal with a lofty crest. The quadruped, being in pain and constraint, necessarily trips, and cannot save itself from falling. Kicking in harness; running away and being run into.

Symptoms.—Air being admitted creates inflammation, and this inflammation causes constitutional irritability. Bursæ are attended with least danger when punctured; sheaths of tendons are more dangerous; joints are by far the most serious. Judge which of these has taken place, by the extent of the wound, and the quantity of synovia released.



THE MANNER OF OPENING THE DIRT-SAC, IN CASE ONE SHOULD BE PRESENT WITH OPEN JOINT.

Treatment.—Exercise gentleness toward the injured animal. Wash as directed for broken knees. Examine if there be any sac or bag into which dirt could have entered. If one exists, place a large spatula under the knee; then take a knife with a sharp point, but with its edge blunted the two posterior thirds of its length; guard the point with a lump of bees-wax; introduce this into the sac and drive the point through the bottom of the bag. An opening will thereby be created, through which the pus and dirt will gravitate. If the probe enters the knee of the flexed leg unopposed, three quarters of an inch, push it no farther; be satisfied the cavity is opened.

Open Synovial Joints.—*Treatment.*—Proceed in the first instance as for broken knees. Then give a drink composed of sulphuric ether and laudanum, of each 1 ounce; water, $\frac{1}{2}$ pint. Look to the comfort. Should the eye rove, the breathing be hard; ears active, and the horse start at sounds, hourly repeat the drink before recommended, till these symptoms abate. Then place in a stall and allow four drinks and two pots of stout daily. Use the arnica lotion, as

for broken knees, during the first three and a half days. At the end of that time turn the horse gently round in the stall, and let it stand with its head toward the gangways. Place the slings before the horse, and leave the animal to contemplate them for half an hour. Then, with extreme gentleness, fix them; but do not pull the cloth up to the abdomen. Leave a pail of water suspended from one pillar, and feed from a high trough, supported upon light legs. Let the horse be watched night and day for the remainder of the week. When the animal is at ease in the slings, these may be heightened till the cloth lightly touches, but not presses, against the belly. With the slings change to the chlo-



OPEN JOINT ENSUING UPON BROKEN KNEE, AND SOLELY CAUSED BY THE ABUSE OF BANDAGES.



THE GENERAL APPEARANCE OF AN OPEN JOINT WHEN FIRST SUBMITTED TO THE NOTICE OF THE SURGEON.

ride-of-zinc lotion, 1 scruple to the pint of water; have this frequently applied during the day. It will coagulate the albumen and promote the healing of the wound. The albumen will accumulate as a large ball in front of the injury; do not touch it. Allow it to fall off. The cure is nearly perfect when it falls. When pressure can be endured, the slings may be removed; though the healing process should be confirmed before the animal is allowed to stand near anything against which it could strike the knee.

Ossified Cartilages.—*Cause.*—Battering the foot upon hard roads.

Symptoms.—Of little consequence in heavy horses unless accompanied with ring-bone. The disease causes lameness in light horses used for fast work.

Treatment.—Rest; liberal food; and small blisters to the foot immediately above the sides of the hoof.

Overreach.—*Cause.*—When a good stepper is very tired, this accident sometimes happens: the coronet of the fore foot upon the outer side being severely wounded by the inside of the hind shoe.



THE ALBUMINOUS BALL, WHICH FORMS IN SHAPE OF AN OPEN JOINT WHEN TREATED WITH A SOLUTION OF CHLORIDE OF ZINC.

Symptom.—A severe wound and a large slough, probably followed by a false quarter.



OVERREACH
RING DURING THE
EXHAUSTION OF
LIGHT HORSES.

Treatment.—Feed liberally, and bathe the injury thrice daily with the chloride-of-zinc lotion, 1 grain to the ounce of water.

Partial Paralysis.—*Cause.*—Violent exertion.

Symptom.—One hind leg gets in the way of the other, and threatens to throw the animal down.

Treatment.—A loose box; warm clothing; good grooming; warmth to loins; regulate the bowels with mashes; absolute rest. Give the following ball night and morning: Strychnia, $\frac{1}{2}$ grain (gradually work this medicine up to 1 $\frac{1}{2}$ grains); iodide of iron, 1 grain; quassia powder and treacle, a sufficiency.

Phlebitis, or Inflammation of the Vein.—*Cause.*—Motion. Bleeding in the neck and turning out to grass; or from either of the limbs, and then forcing the animal to walk.

Symptoms.—The earliest indication is a separation of the lips of the wound and the presence of a small quantity of thin discharge. A small swelling then takes place, and the vein hardens above the puncture. Then abscesses form along the course of the vessel. These mature, burst, send forth a contaminated pus. The abscesses are united by sinuses. If these signs are neglected, a dark discharge resembling decayed blood issues from the numerous wounds and soils the neck. Dullness ensues; the brain becomes affected; and the horse perishes phrenitic.



THE THIRD STAGE OF PHLEBITIS.

Treatment.—Remove the pin and apply a blister. Another may be required. In bad cases, blister must follow blister, but not be rubbed in. A little oil of cantharides should be put over the sore with a paste-brush. Place in a loose box and litter with tan; feed on slops, which require no mastication. Let the horse remain there and be so fed for six weeks subsequent to the cessation of all treatment. Then give a little exercise at a slow pace, gradually augmented. At the end of three months the horse may do slow work. But the horse should not wear a collar or go into the shafts before the expiration of six months.

Phrenitis, or Inflammation of the Brain.—*Causes.*—Various, often unknown.

Symptom.—Heaviness, succeeded by fury in excess, but without any indication of malice.



A HORSE MAD, OR WITH INFLAMMATION OF THE BRAIN.

Treatment.—Bleed from both jugulars till the animal drops. Then pin up, and give a purgative of double strength. Follow this with another blood-letting, if necessary, and scruple doses of tobacco; $\frac{1}{2}$ -drachm doses of aconite root; or drachm doses of digitalis—whichever is soonest obtained. But whichever is procured must be infused in a pint of boiling water, and when cool and strained, it ought to be given every half-hour till the animal becomes quiet. The probable result is by no means cheering, even if death is by these means avoided.

Pleurisy.—*Causes.*—Over-exertion; blows; injuries; cold.

Symptoms.—These are quickly developed. The pulse strikes the finger; pain continuous; agony never ceases; horse does not feed. Body hot; feet cold; partial perspirations. Muscles corrugated in places; cough, when present, suppressed and dry; auscultation detects a grating sound and a dull murmur at the chest. Pressure between the ribs produces great pain or makes the animal resentful. The head is turned very often toward the side; the forefoot paws; the breathing is short and jerking.

Treatment.—Should be active. Bleed to ease the horse, place in a loose box; bandage the legs; leave the body unclothed. Give, every quarter of an hour, a scruple of tincture of aconite in a wineglass of warm water. When pulse has softened, give, every second hour, sulphuric ether and laudanum, of each 1 ounce; water, $\frac{1}{2}$ pint. Do not bleed a second time. Steam. Do nothing for the bowels. Place lukewarm water within easy reach of the head, and give nothing more while the disease rages. When the disease departs, return with caution to full food. After the affection subsides, blister throat and chest

If the horse is costive, administer enemias; or a bundle of cut grass may be presented with the other food.

Pneumonia.—*Causes.*—Fat; irregular work; and sudden exertion.

Symptoms.—Breathing labored; oppressed pulse; partial consciousness; giddiness. Standing with outstretched legs; head and ears dejected; coat rough; extremities and body cold; visible membranes discolored; bowels costive; feeling half dead; and general oppression.

Treatment.—Bleed but once; take only blood sufficient to restore consciousness; do not attempt to obtain blood, if the liquid flows black and thick. Place in a loose box strewn with damp tan; take off the shoes; place water within easy reach; no food. If winter, clothe; then introduce steam; when the steam is abundant, take off the clothes. Give solution of aconite root, $\frac{1}{2}$ ounce; sulphuric ether, 2 ounces; extract of belladonna (rubbed down with $\frac{1}{2}$ pint of water), 1 drachm. Repeat the drink three times each day. When the pulse improves, withdraw the aconite; when the breathing amends, omit the belladonna; or increase either as pulse or breathing becomes worse. Allow only hay tea, with a little oatmeal in it, until the disease abates. On amendment, cautiously increase the food. Lying down is the first sign of improvement. Do not disturb the animal; it must require rest, having stood throughout the attack.

Poll Evil.—*Causes.*—Hanging back in the halter; hitting the poll against the beam of the stable-door; blows on the head; and any external injury.



POLL EVIL DURING THE FIRST STAGE.

Symptoms.—The nose is protruded and the head kept as motionless as possible; the animal hangs back when it is feeding from the manger. Pressure, or enforced motion excites resistance. Swelling; the swelling bursts in several places, from which exudes a foul, fistulous discharge. Pus has been secreted; confinement has caused it to decay; while motion and fascia have occasioned it to burrow.

Treatment.—Paint the part lightly with tincture of cantharides or acetate of cantharides. Do this

daily till blistering ensues; then stop. When the swelling enlarges, open the prominent or soft places. Allow the pus to issue; then cut down



POLL EVIL IN ITS SECOND STAGE, OR WHEN READY FOR OPERATION.

on the wound till the seat of the disease is gained. Use a proper knife, and include as many pipes as possible in one clean cut. All others should join this. Empty out all concrete matter. Wash the cavity with cold water. Excise all loose pieces of tendon and all unhealthy flesh. Moisten the sore with chloride-of-zinc lotion, one grain to the ounce, and cover the wound with a cloth dipped in the solution of tar. If the disease has burst, still include the pipes in one smooth incision; clean out the concrete pus; and treat as has been directed. Spare the ligament which lies under the mane; and work in a breast-strap after recovery.

Prick of the Sole.—*Cause.*—Generally the smith's carelessness when shoeing the horse.

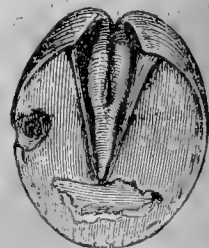
Symptom.—Great lameness.

Treatment.—Withdraw the nails of the shoe. If one is wet, cut down on that hole until the sensitive sole is exposed. If not very lame, treat with lotion of chloride of zinc, 1 grain to the ounce of water. If very lame, treat as if the injury were a suppurating corn.

Prurigo.—*Cause.*—Heat of body.

Symptom.—Itchiness. The horse rubs off hair; but never exposes a dry, corrugated surface.

Treatment.—Take away part of the hay. Give two bundles of grass per day. Allow two bran mashes each day till the bowels are open. Apply either of the following washes: Animal glycerine, 1 part; rose-water, 2 parts. Or, sulphuric acid, 1 part; water, 10 parts. Or, acetic acid, 1 part; water, 7 parts. Drink: Liquor arsenicalis, 1 ounce; tincture of muriate of iron, $1\frac{1}{2}$ ounces; water, 1 pint;— $\frac{1}{2}$ pint to be given every



PRICK OF THE FOOT AND BRUISE OF THE SOLE.

The smaller opening represents prick of the foot; the larger space indicates bruise of the sole. The extent to which the horn may be removed, in the generality of cases is also indicated.

night. Withdraw the drink a week after the disease has disappeared. Allow a pot of porter and an extra feed of oats each day.

Pumice-Foot.—*Cause.*—An animal reared on marshy land, having high action, batters the feet upon pavements.

Symptoms.—Bulging sole; weak crust; strong bars, and good frog.



THE SIDE VIEW OF A PUMICED FOOT.



THE SOLE OF A PUMICED FOOT.

Showing the swollen or rounded state of the sole, with the brittle and uneven condition of the crust.

Displaying a ragged wall, and exhibiting a very healthy frog and a bulging sole.

Treatment.—The only relief possible is afforded by a bar-shoe of the dish kind, and a leathern sole. The constant use of equal parts of animal glycerine and tar is also beneficial to the hoof.



A DISH-SHOE. Employed in Cases of Severe Pumice-foot.

Purpura Hemorrhagica.—*Cause.*—Unknown. Universal congestion.

Symptoms.—The attack is sudden. The body, head and limbs enlarge; consciousness is partially lost. The horse stands, and the breathing is quickened. Through the skin there exudes serum with blood. The nostrils and lips enlarge, and part of the swollen tongue protrudes from the mouth. The appetite is not quite lost, although swallowing is difficult. Thirst is great.

Treatment.—Bleed till the animal appears relieved. A second venesection may be demanded, but it should be adopted with caution. Give ½ ounce of chloroform in a pint of linseed oil, in the first stage. Repeat the dose in half an hour. No amendment following; give 2 ounces of sulphuric ether in 1 pint of cold water. In



DIAGRAM.

Which supposes the outward covering of the coronet and the horny wall of the hoof removed, to expose the ravages of quittor, when commencing in the coronet of a heavy horse.

half an hour repeat the dose if necessary. Perform tracheotomy to ease the breathing. Incise the protruding tongue. Squeeze out the fluid and return the organ to the mouth. Should the skin slough, bathe the part with solution of chloride of zinc, 1 grain to the ounce of water.

Quittor.—*Causes.*—Confined pus from suppurating corn; or prick of the sole; matter results, and this issues at the coronet. Or from injury to the coronet, generating pus, and this

burrowing downward, as it cannot pierce the coronary substance. The secretion may also penetrate the cartilage, and thus establish sinuses in almost every direction.

Symptoms.—The horse is very lame. The animal is easier after the quittor has burst. Probe for the sinuses. If, after the superficial sinuses are treated, among the creamy pus there should appear a dark speck of albuminous fluid, make sure of another sinus, probably working toward the central structures of the foot.



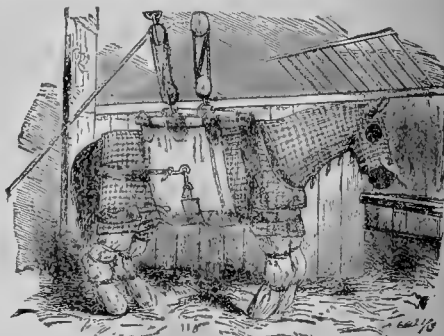
A QUITTOR, AS IT DENOTES ITS EXISTENCE BEFORE THE PUS ABSORBS ITS WAY THROUGH THE CORONET.



A QUITTOR, AFTER THE PUS HAS FOUND AN EXIT AT THE CORONET.

Rheumatism.—*Cause.*—Generally follows other disorders, as influenza, chest affections, and most acute diseases. Very rarely does it appear without a forerunner.

Symptoms.—Swelling of particular parts, generally the limbs; heat and acute lameness. The disorder is apt to fly about the body. The synovia is always increased when the joints are attacked. The pulse and breathing are both disturbed by agony.



A HORSE DRESSED FOR RHEUMATISM.

Treatment.—Lead into a loose box; fill the place with steam. Get ready the slings; put the belly-piece under the horse, but do not pull it up so as to lift the legs from the ground. Keep the steam up for one hour. Then have several men with cloths ready to silently wipe the animal dry. Next rub into the diseased parts the following: Compound soap liniment, 16 ounces; tincture of cantharides, liquor ammonia, and laudanum, of each 2 ounces. Afterward incase the limbs in flannel. Then give a bolus composed of powdered colchicum, 2 drachms; iodide of potassium, 1 drachm; simple mass, a sufficiency. Should the attack suc-

ceed upon other diseases, the diet must be supporting, everything being softened by heat and water. Next morning repeat the steaming, and give calomel, 1 scruple; opium, 2 drachms. At night steam again, and repeat the first bolus. Should the horse be fat, withdraw all corn, if the strength can do without it.

Ring-Bone.—*Cause.*—Dragging heavy loads up steep hills

Symptoms.—A roughness of hair on the pastern and a bulging forth of the hoof. A want



THE PASTERN AND PEDAL-BONE OF A HORSE AFFECTED WITH SEVERE RING-BONE.

1. The joint between the pastern-bones, showing the groove in which the tendon of the extensor-pedis muscle reposed.

2. The joint between the lower-pastern and the bone of the foot.



THE FOOT OF A LIVING HORSE WITH AGGRAVATED RING-BONE.

The animal, from which the above sketch was taken, although used to propel a cart was by no means of a cart breed. The creature rather hobbled than went lame; but all flexion was entirely lost in the pastern-bones.

of power to flex the pastern. An inability to bring the sole to the ground except on an even surface. Loss of power and injury to utility.

Treatment.—In the first stage apply poultices, with 1 drachm of camphor and of opium. Afterward rub with iodide of lead, 1 ounce; simple ointment, 8 ounces. Continue treatment for a fortnight after all active symptoms have subsided, and allow liberal food and rest; work gently when labor is resumed.

Ring-Worm.—*Symptoms.*—Hair falls off in patches, exposing a scurfy skin. The scurf congregates on the bare place about the circumference, which is apt to ulcerate.

Treatment.—Keep very clean. Wash night and morning, and afterward apply the following ointment: Animal glycerine, 1 ounce; spermaceti, 1 ounce; iodide of lead, 2 drachms. A drink is likewise of use when employed with the ointment. Liquor arsenicalis, 1 ounce; tincture of muriate of iron, 1½ ounces; water, 1 quart. Mix, and give every night half a pint for a dose. Should the ulceration prove obstinate, apply permanganate of potash, ½ ounce; water, 3 ounces. Or, chloride of zinc, 2 scruples; water, 1 pint. Moisten the parts with a soft brush six times daily. Feed well, and do not work for a month.

Roaring.—*Cause.*—The check-rein.

Symptom.—A noise made at each inspiration;

Treatment.—No remedy.

Rupture, or Stricture of the Œsophagus.—*Cause.*—The use of the butt-end of a carter's whip, which either rends the lining membrane of, or ruptures, the gullet.

Symptom of Rupture.—The body becomes distended with gas, and death ensues. *Of Rent Membrane.*—This induces a disinclination to feed, as the first symptom. A stricture is formed. Excessive hunger. Distension of the tube. A large sac is developed out of the stretched membrane above the stricture. Then,



THE HORSE ENDEAVORING TO CAST UP THE PROVENDER WITH WHICH THE SAC OF A STRICTURED ŒSOPHAGUS IS LOADED.

after feeding, the animal fixes the neck, and returns the masticated food through the mouth and nostrils. Accompanying loss of condition and failure of strength.

Treatment.—Feed on prepared soft food; though the horse is generally not worth its ordinary keep at the stage when this is required.

Sandcrack.—*Causes.*—Bad health, provoking imperfect secretion. Treading for any length of time upon a very dry soil.

Symptoms.—Quarter-crack occurs on light horses upon the inner side of the hoof. It usually commences at the coronet, goes down the foot, and reaches to the laminae. Toe-crack



A PARTIAL QUARTER SAND-CRACK DRESSED AND SHOD.



THE METHODS OF ERADICATING A SANDCRACK: EITHER THE SEMICIRCULAR OR THE ANGULAR LINES, ARE EQUALLY EFFECTIVE.

happens in heavy wheelers, and is caused by digging the toe into the ground when dragging a load up hill. From the sensitive laminae, when exposed; fungoid granulations sometimes sprout, which, being pinched, produce excessive pain and acute lameness.

Treatment.—Always pare out the crack, so as to convert it into a groove. When the crack is partial, draw a line with a heated iron above and below the fissure. If granulations have sprouted, cleanse the wound with chloride-of-zinc lotion, one grain to the ounce of water, and then cut them off. Afterward place the foot in a poultice. Subsequently pare down the edges of the crack while the horn is soft. Use the lotion frequently. Draw lines from the coronet to the crack, so as to cut off communication between the fissure and the newly-secreted horn. Shoe with a bar-shoe, having the seat of crack well eased off, and also a clip on either side. If the horse must work, lay a piece of tow saturated with the lotion into the crack; bind the hoof tightly with wax-end. Tie over all a strip of cloth, and give this a coating of tar. When the horse returns, inspect the part. Wash out any grit with the chloride-of-zinc lotion.

Scald Mouth.—**Cause.**—Powerful medicine, which burns the lining membrane of the mouth.

Symptom.—A dribbling of saliva, with constant motion and repeated smacking of the lips.

Treatment.—Give soft food, and use the wash recommended for aphthæ.

Seedy Toe.—**Cause.**—Weakness, inducing an imperfect secretion of horn.

Symptom.—A separation between the crust of the coronet and the soft horn of the laminae, commencing at the toe of the foot.

Treatment.—Remove the shoe. Probe the fissure, which will be exposed. Cut away all the separated crust. Throw up until the removed portion has grown again.

Simple Ophthalmia.—**Causes.**—Slashing with the whip over the head; hay-seeds falling into the eyes; horses biting at each other; blows, etc.



A READY MODE OF BLINDING A HORSE, AND OF APPLYING A LOTION TO THE EYES IN SIMPLE OPHTHALMIA.

Symptoms.—Tears; closed eyelid; the ball of the eye becomes entirely or partially white.

Treatment.—Remove any foreign body; fasten a cloth across the forehead; moisten it with a decoction of poppy-heads to which some tincture of arnica has been added. If a small abscess

should appear on the surface of the eye, open it, and bathe with chloride-of-zinc lotion. Should



AN EYE RECENTLY AFFECTED WITH SIMPLE OPHTHALMIA.

inflammation be excessive, puncture eye-vein, and place some favorite food on the ground.

Siftast.—**Causes.**—Ill health; badly-fitting saddle; too energetic a rider; loose girths; ruck in the saddle-cloth.

Symptom.—Like a corn on the human foot, but the hard, bare patch is surrounded by a circle of ulceration.

Treatment.—The knife should remove the thickened skin. Chloride of zinc, 1 grain; water, 1 ounce, to the wound. Attend to the bowels. Feed liberally; exercise well; and give, night and morning, liquor arsenicalis, $\frac{1}{4}$ ounce; tincture of muriate of iron, $\frac{1}{2}$ ounce; water, 1 pint. Mix, and give.

Sore Throat.—**Causes.**—In colts, change from freedom to work, from the field to the stable, is the cause. Sore throat, however, may be caused by close stables, or be an indication of some greater disease.

Symptoms.—Perpetual deglutition of saliva; want of appetite; inability to swallow a draught of liquid—the fluid returning partly by the nostrils, and each gulp being accompanied with an audible effort.

Treatment.—Forbear all work; clothe warmly; house in a large, well-littered, loose box. Gruel for drink; three feeds of bruised and scalded oats, also beans, daily. If the bowels are obstinate, administer a drink composed of solution of aloes, 4 ounces; essence of anise-seed, $\frac{1}{2}$ ounce; water, 1 pint. Should the throat not amend, dissolve $\frac{1}{2}$ ounce of extract of belladonna in a gallon of water; hold up the head; pour half a pint of this preparation into the mouth; and in thirty seconds let the head down; do this six or eight times daily. No improvement being observed, try permanganate of potash, $\frac{1}{4}$ pint; water, 1 gallon: to be used as directed in the previous recipe. Still no change being remarked, prepare chloride of zinc, 3 drachms; extract of belladonna, $\frac{1}{2}$ ounce; tincture of capsicums, 2 drachms; water, 1 gallon.

All being useless, give two pots of stout daily, and blister the throat.

No alteration ensuing, cast the horse, and mop out the fauces with a sponge which is wet with

nitrate of silver, 5 grains; water, 1 ounce. Give a ball daily composed of oak-bark and treacle.

If none of these measures succeed, the throat must be complicated with some other disease.

Spasm of the Diaphragm.—*Cause.*—Imprudently riding too far and too fast.

Symptom.—Distress, and a strange noise heard from the center of the horse.

Treatment.—Pull up; cover the horse's body; lead to the nearest stable. Give as soon as possible a drink composed of sulphuric ether, 2 ounces; laudanum, 1 ounce; tincture of camphor, ½ ounce; cold water or gruel, 1 pint. Give four drinks, one every quarter of an hour; then another four, one every half-hour, and then at longer intervals as the animal recovers. Bandage the legs, and sponge the openings to the body. This done, and sweat and dirt removed, clothe perfectly after the skin is quite dry.

Spasm of the Urethra.—*Cause.*—Acridity in the food or water.

Symptoms.—Small and violent emissions; straddling gait. Roached back; pain; total suppression of urine.

Treatment.—Insert the arm up the rectum, and feel the gorged bladder. Give, by the mouth, 4-ounce doses of sulphuric ether and of laudanum mixed with a quart of cold water, and, as injection, mixed with three pints of cold water. Repeat these medicines every quarter of an hour until relieved. If no physic be at hand, open both jugular veins, and allow the blood to flow until the horse falls. Should the urine then not flow forth, insert the arm and press upon the bladder.

Spasmodic Colic; Fret; Gripes.—*Causes.*—Fast driving; change of water; change of food; getting wet; fatiguing journeys; aloes; and often no cause can be traced.

and fits of pain; the exemptions grow shorter as the attacks become longer; the horse crouches; turns round; then becomes erect; pawing, etc., follow; a morbid fire now lights up the eyes. *3d Stage.*—Pains lengthen; action grows more wild; often one foot stamps on the ground; does not feed, but stares at the abdomen; at last, without warning, leaps up and falls violently on the floor; seems relieved; rolls about till one leg rests against the wall; should no assistance be now afforded, the worst consequences may be anticipated.

Treatment.—Place in a loose box, guarded by trusses of straw ranged against the walls. Give 1 ounce each of sulphuric ether and of laudanum in a pint of cold water, and repeat the dose every ten minutes if the symptoms do not abate. If no improvement be observed, double the active agents, and at the periods stated persevere with the medicine. A pint of turpentine, dissolved in a quart of solution of soap, as an enema, has done good. No amendment ensuing, dilute some strong liquor ammonia with six times its bulk of water, and saturating a cloth with the fluid, hold it by means of a horse-rug close to the abdomen. It is a blister; but its action must be watched or it may dissolve the skin. If, after all, the symptoms continue, there must be more than simple colic to contend with.

Spavin.—*Cause.*—Hard work.

Symptom.—Any bony enlargement upon the lower and inner side of the hock. Prevents the leg being flexed. Hinders the hoof from being turned outward. Causes the front of the shoe to be worn and the toe of the hoof to be rendered blunt by dragging the foot along the ground. Leaves the stable limping; returns bettered by exercise.



BONE-SPAVIN.
A swelling or bony tumor, situated upon the lower and inner part of the hock-joint.

Treatment.—View the suspected joint from before, from behind and from either side. After-



THE NATURAL POSITION OF THE HEALTHY FOOT WHEN RAISED FROM THE EARTH DURING AN EASY TROT.



THE FOOT, INCAPABLE OF BEING FREELY RAISED FROM THE GROUND, BY A HORSE WHICH IS BADLY SPAVINED.

ward feel the hock. Any enlargement upon the seat of disease, to be felt or seen, is a spavin.



SPASMODIC COLIC.

Symptoms. *1st Stage.*—Horse is feeding; becomes uneasy; ceases eating; hind foot is raised to strike the belly; fore foot paws the pavement; the nose is turned toward the flank, and an attack of fret is recognized. *2d Stage.*—Alternate ease

Feed liberally, and rest in a stall. When the part is hot and tender, rub it with belladonna and opium, 1 ounce of each to an ounce of water. Apply a poultice. Or put opium and camphor on the poultice. Or rub the spavin with equal parts of chloroform and camphorated oil. The heat and pain being relieved, apply the following, with friction: Iodide of lead, 1 ounce; simple ointment, 8 ounces.

THE INNER SIDE OF THE HOCK AFFLICTED WITH HIGH OR INCURABLE SPAVIN.

Specific Ophthalmia.—*Cause.*—The fumes of impure stables.

Symptoms.—A swollen eyelid; tears; a hard pulse; sharp breathing; a staring coat; a clammy mouth; the nasal membrane is inflamed or leaden-colored; the lid can only be raised when in shadow. The ball of eye reddened from the circumference; the pupil closed; the iris lighter than is natural. The disease may change from eye to eye; the duration of any visitation is very uncertain; the attacks

may be repeated, and end in the loss of one or both eyes. If one eye only is lost, the remaining eye generally strengthens.

Treatment.—Remove from the stable and place in a dark shed. Open the eye-vein; and puncture the lid if needed; put a cloth saturated with cold



RAISING THE UPPER LID OF AN EYE AFFECTED WITH SPECIFIC OPHTHALMIA.

water over both eyes. If the horse is poor, feed well; if fat, support, but do not cram; if in condition, lower the food. Sustain upon a diet which requires no mastication. Give the following ball twice daily: Powdered colchicum, 2 drachms; iodide of iron, 1 drachm; calomel, 1 scruple. Make up with extract of gentian. So soon as the ball affects the system, change it for liquor arsenicalis, 3 ounces; muriated tincture of iron, 5 ounces. Give $\frac{1}{2}$ ounce in a tumbler of water twice daily. See that the stable is rendered pure before the horse returns to it.

Splint.—*Causes.*—Early and hard work; blows, kicks, etc.

Symptom.—Any swelling upon the inner and lower part of the knee of the foreleg, or any enlargement upon the shin-bone of either limb. On the knee they are important, as they extend high up. On the shin they are to be dreaded, as they interfere with the movements of the tendons. All are painful when growing, and in that state generally cause lameness.

Treatment.—Feel down the leg. Any heat, tenderness or enlargement is proof of a splint. If, on the trot, one leg is not fully flexed, or the horse “dishes” with it, it confirms the opinion. Time and liberal food are the best means of perfecting them. When they are painful, poultice, having sprinkled on the surface of the application

1 drachm each of opium and of camphor. Or rub the place with 1 drachm of chloroform and 2 drachms of camphorated oil. When a splint interferes with a tendon, the only chance of cure is to open the skin and to cut off the splint, afterward treating the wound with a lotion composed of chloride of zinc, 1 grain; water, 1 ounce. To check the growth of a splint, rub it well and frequently with iodide of lead, 1 ounce; simple ointment, 8 ounces.

Sprain of the Back Sinews.—*Cause.*—Cart-work upon a hilly country.

Symptom.—Gradual heightening of the hind heel.

Treatment.—The only possible relief is afforded by an operation—“division of the tendons.”

Staggers.—Sleepy staggers and mad staggers are only different stages of the same disorder.

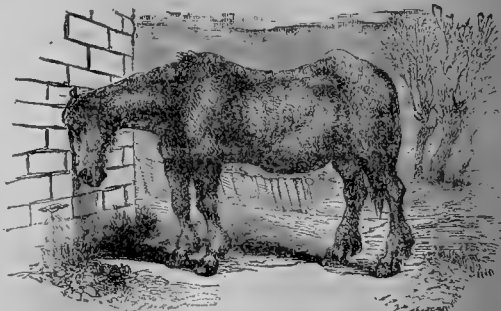
Cause.—Over-gorging.

Symptoms.—Excessive thirst; dullness or sleepiness; snoring; pressing the head against a wall.



SPLINTS OF A SERIOUS KIND.

1. A splint involving the bones of the knee-joint.
2. A splint interfering with the action of the back sinews.
3. A small splint situated under the tendon of an extensor muscle.



SLEEPY STAGGERS, FROM OVER-GORGING.

Some animals perish in this state; others commence trotting without taking the head from the wall, and such generally die, but sometimes re-

cover. Other horses quit the sleepy state; the eyes brighten; the breath becomes quick. Such animals exhibit the greatest possible violence, but without the slightest desire for mischief.

Treatment.—Allow no water. Give a quart of oil. Six hours afterward give another quart of oil, with 20 drops of croton oil in it, should no improvement be noticed. In another six hours, no amendment being exhibited, give another quart of oil, with 30 drops of croton oil. After a further six hours, repeat the first dose, and administer the succeeding doses, at the intervals already stated, until the appearance changing indicates that the body has been relieved.

For the full development of the mad stage no remedies are of the slightest avail.

Strain of the Flexor Tendons.—*Cause.*—Hard work on uneven ground, or the rider punishing a horse with the snaffle and the spurs.

Symptoms.—The animal goes oddly, not lame. The defective action will disappear upon rest, but stiffness is aggravated by subsequent labor. Any attempt to work the horse sound induces incurable lameness or contraction of the tendons.

Treatment.—Allow several hours to elapse before any attempt is made to discover the disease. A small swelling, hot, soft and sensitive, may then appear. Bind round it a linen bandage, and keep it wet with cold water. Bathe this for the first three nights; afterward apply moisture only by day. Stop working the horse. Give 4 drachms of aloes. Do not turn out, but allow two feeds of corn each day. Keep in a stall, and do not put to work till more than recovered.

Strangles.—*Cause.*—Something requiring to be cast from the system, so as to suit the young body to a sudden change.

Symptoms.—A slight general disturbance, which, however, remains. The colt continues

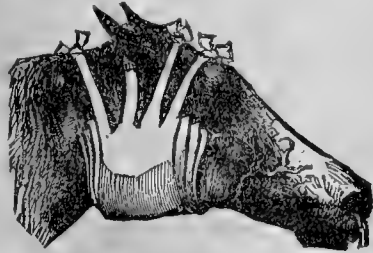


OPENING THE ABSCESS OF STRANGLES.

sickly. After a day or two, the neck becomes stiff, and a swelling appears between the jaws. The enlargement, at first is hard, hot and tender. A discharge from the nose comes on. The symptoms increase; the throat becomes sore. Breath-

ing is oppressed; coat stares; appetite is lost; tumor softens, and, being opened, the animal speedily recovers.

Treatment.—Neither purge nor bleed. Give all the nourishment that can be swallowed. Corn, ground and scalded, may be offered, a little at a time, from the hand. No grooming; light clothing; ample bed; door and window of loose box should be open. Gently stimulate the throat



A HORSE WITH STRANGLES WEARING AN EIGHT-TAILED BANDAGE.

with the following: Spirits of turpentine, 2 parts; laudanum, 1 part; spirits of camphor, 1 part. Apply with a paste-brush morning, noon and night, until the throat is sore. After every application, take three pieces of flannel, place these over the part, and bind on with an eight-tailed bandage. So soon as the tumor points, apply the twitch, and have one foreleg held up. Then open the swelling with an abscess-knife. It may be necessary to make another incision.

Stringhalt.—*Cause.*—Over-exertion.

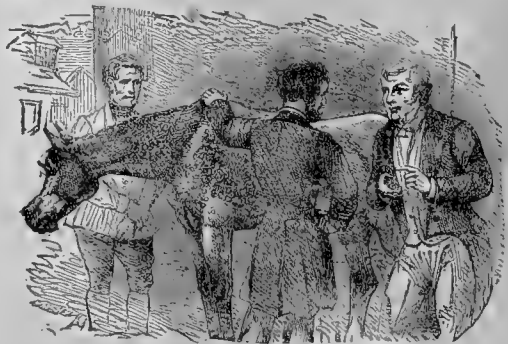
Symptom.—Raising both hind legs, one after the other, previous to starting.

Treatment.—None is possible.

Surfeit.—*Cause.*—Heat of body.

Symptom.—An eruption of round, blunt and numerous spots.

Treatment.—If the pulse is not affected, the symptom may disappear in a few hours. Look



A HORSE AFFECTED WITH SURFEIT.

to the food. Abstract eight pounds of hay, and allow two bundles of cut grass per day. Even increase the oats, but with each feed give a handful of old crushed beans. The following drink will be of service: Liquor arsenicalis, 1 ounce;

tincture of muriate of iron, $\frac{1}{2}$ ounces; water, 1 quart. Mix. Give daily, 1 pint for a dose.

Symptom.—If a young horse has been neglected through the winter, the surfeit lumps do not disappear. An exudation escapes; the constitution is involved, and the disease is apt to settle upon the lungs.

Treatment.—Do not take out. Keep the stable aired, and attend to cleanliness. Feed as previously directed, and allow bran mash when the bowels are constipated. Administer the drink recommended above, night and morning. Clothe warmly; remove from a stall to a loose box. Should the pulse suddenly sink, allow two pots of stout each day. If the appetite fail, give gruel instead of water, and present a few cut carrots from the hand. The shortest of these cases occupy a fortnight.

Swollen Legs.—*Cause.*—Debility.

Treatment.—Place in a loose box. No hay for some weeks. Dampen the corn, and sprinkle a handful of ground oak-bark on each feed. Attend to exercise. If the legs continue to enlarge, hand-rub them well and long.

Teeth.—*Cause.*—A thickening of the membrane sometimes conceals the upper tushes and provokes constitutional symptoms.

Treatment.—Lance the membrane.

Symptoms of Toothache.—Head carried on one side, or pressed against the wall; saliva dribbles from the lips; quidding or partial mastication of the food, and allowing the morsel to fall from the mouth. Appetite capricious; sometimes spirit is displayed—then the horse is equally dejected. The tooth dies; the opposing tooth grows long. The opposite teeth become very sharp, from the horse masticating only on one side. The long tooth presses upon the gum and provokes nasal gleet.

Treatment.—Chisel off projecting tooth; file down the sharp edges of the opposite teeth, and look to the mouth frequently.

Tetanus.—*Causes.*—Cold rain; draughts of air; too much light; wounds.



THE TEST FOR TETANUS, WHEN NOT FULLY DEVELOPED.

Symptoms.—The wound often dries up. The horse grows fidgety. Upon lifting up the head,

“the haw” projects over the eye. The tail is raised; the ears are pricked; the head is elevated; the limbs are stiff; the body feels hard. Any excitement may call up a fearful spasm.

Treatment.—Give a double dose of purgative medicine. Place in solitude and in quiet. Put a pailful of gruel and a thin mash within easy reach of the head.

Thorough-Pin.—*Cause.*—Excessive labor.

Symptom.—A round tumor going right through the leg, and appearing anterior to the point of the hock. It is nearly always connected with bog-spavin.



DISSECTION OF THOROUGH-PIN AND BOG-SPAVIN, DEMONSTRATING THE JUNCTION OF THE TWO AFFECTIONS.

Treatment.—Never attack thorough-pin and bog-spavin at the same time. Relieve the thorough-pin first by means of rags, cork and an India-rubber bandage, cut so as not to press on the bog-spavin. If the corks occasion constitutional symptoms, use a truss to press upon the thorough-pin, which being destroyed, apply a perfect bandage and wetted cloths to the bog-spavin. When attempting to cure bog-spavin, however, continue the remedy to the thorough-pin, or the cure of one affection may reproduce the other.

Thrush.—*Cause.*—Standing in filth, when it appears in the hind feet; navicular disease, when seen in contracted feet.

Symptoms.—A foul discharge running from the cleft of the frog. This decomposes the horn.



THRUSH IN THE FORE FOOT, WITH A THICK CRUST, A CONCAVE SOLE, AND A SMALL FROG.



THRUSH IN THE HIND FOOT.

The surface of the frog becomes ragged, and the interior converted into a white powder. The affection does not generally lame; but should the horse tread on a rolling stone, it may fall as though it were shot.

Treatment.—Pare away the frog till only sound horn remains, or until the flesh is exposed. Then tack on the shoe and return to a clean stall. Apply the chloride-of-zinc lotion—three grains to the ounce of water—to the cleft of the frog by means of some tow, wrapped round a small bit of stick. When the stench has ceased, a little liquor of lead will perfect the cure. For contracted feet pare the frog, and every morning dress once with the chloride-of-zinc lotion; but do not strive to stop the thrush.

Tread.—*Cause.*—Fatigue and overweight.

Symptom.—In light horses it occurs towards the end of a long journey. The hind foot is not removed when the fore foot is put to the ground. The end of the fore shoe consequently tears off a portion of the coronet from the hind foot. In cart-horses, after the horse is fatigued the load has to be taken down a steep hill; the animal, being in the shafts, rocks to and fro; the legs cross, and the calk of one shoe wounds the coronet of the opposite hoof.



TREAD IN LIGHT HORSES. The hind foot, from fatigue not being removed soon enough, is wounded by the heel of the fore shoe being placed upon its coronet.



TREAD UPON THE HIND FOOT OF CART-HORSES. The animal become unsteady from exhaustion; the feet cross, and a wound results.

Treatment.—Bathe the sore with the chloride-of-zinc lotion, one grain to the ounce of water. Continue to do this thrice daily; feed liberally. A slough will take place, and the animal be well in about a month; the only danger being, the after-result of a false quarter.

Tumors.—These are so various and of such different natures, that in every case a surgeon should be consulted.

Warts.—*Cause.*—Unknown.

Symptom.—There are three kinds of warts.



HEAD OF A HORSE WITH WARTS.

1st. Some are contained in a cuticular sac, and, upon this being divided, shell out. 2d. The second are cartilaginous and vascular. These grow to some size, and are rough on the surface. They are apt to ulcerate. 3d. Consists of a cuticular case, inclosing a soft granular substance.

Treatment.—When of the first kind, slit up, and squeeze them out; the second kind, excise and apply a heated iron to stop the bleeding. The third kind are better let alone.

Water-Farcy.—*Cause.*—Overwork and coarse

feed, succeeded by periods of stagnation. It is the warning that true farcy threatens the stable.

Symptoms.—Load less and work less.

Treatment.—Improve the diet, and never allow the horse to remain a day in the stable without exercise. Saturate the swollen limb with cold water every morning, and have it afterward thoroughly hand-rubbed until it is perfectly dry. Should lameness remain after the first day, a few punctures may be made into the limb, but only through the skin. Give the following ball every morning: Iodide of iron, 1 drachm; powdered cantharides, 2 grains; powdered arsenic, 1 grain; Cayenne pepper, 1 scruple; sulphate of iron, 1 drachm; treacle and linseed meal, a sufficiency. Mix. The delay even of a day in treatment is attended with danger in this disease.

Wind-Galls.—*Cause.*—Hard work.

Symptoms.—Small enlargements, generally upon the hind legs and below the hocks; no lameness; two wind-galls appear above the pastern, one beneath that joint; after extraordinary labor, the round swellings disappear, and the course of the flexor tendons becomes puffy. Sometimes continued irritation will cause the wind-galls to greatly enlarge, and ultimately provokes their case to change into bone. During these changes the horse is very lame.



THE SITUATIONS AND SHAPES OF WIND-GALLS.

Treatment.—Fold pieces of rags; wet them; put these on the wind-galls, place on the rags pieces of cork, and over the cork lace on an India-rubber bandage. Mind this bandage is constantly worn, save when ridden or driven by the owner. Rest is the only alleviation for the change of structure.

Windy Colic.—*Causes.*—Gorging on green food; but more commonly impaired digestion, consequent upon severe labor and old age.

Symptoms.—Uneasiness; pendulous head; cessation of feeding. Breathing laborious; fidgets; rocking the body; enlargement of the belly; pawing. Standing in one place; sleepy eye; heavy pulse; flatulence, the abdomen greatly enlarged. Breathing very fast; pulse very feeble; blindness; the animal walks round and round till it falls and dies.

Treatment.—Three balls of sulphuret of ammonia, 2 drachms, with extract of gentian and powdered quassia, of each a sufficiency, may be given, one every half-hour. Next, 1 ounce of chloride of potash, dissolved in a pint of cold water, and mingled with sulphuric ether, 2 ounces, should be horned down. In an hour's time, 2 ounces each of sulphuric ether and of laudanum, 1 ounce of camphorated spirits, 1 drachm of

carbonate of ammonia, may be administered. No good effect being produced, throw up a tobacco-smoke enema. As a last resort, procure a stick of brimstone and light it. Remain in the stable while it burns, to see that the sulphureous fumes do not become too powerful for life to inhale them. Continue this measure for two hours; then repeat the remedies previously recommended.

Worms are of four kinds: the *Tænia*, the *Lumbrici*, the *Strongulus* and the *Ascarides*.

The *Tænia* mostly affect the young.

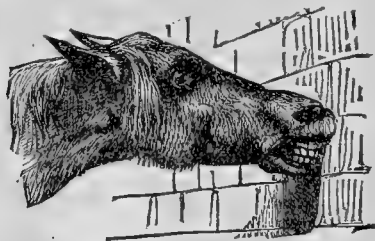
Cause.—Starving the mare when with foal, and breeding from old animals.

Symptoms.—Checked development; large head; low crest; long legs, and swollen abdomen. Appetite ravenous; body thin; coat unhealthy; breath fetid. The colt rubs its nose against a wall, or strains it violently upward; picks and bites its own hair.

Treatment.—Give spirits of turpentine. To a foal, 2 drachms; to a three-months-old, $\frac{1}{2}$ ounce; six months, 1 ounce; one year, $1\frac{1}{2}$ ounces; two years, 2 ounces; three years, 3 ounces; four years and upwards, 4 ounces. Procure 1 pound of quassia chips; pour on them 3 quarts of boiling water. Blend with the turpentine a proportionate quantity of the quassia infusion, by means of yolks of eggs; add 1 scruple of powdered camphor, and give first thing in the morning. Good food is essential afterward. Subsequently give every morning, till the coat is glossy, liquor arsenicalis, from 1 to 8 drachms; muriated tincture of iron, from $1\frac{1}{2}$ to 12 drachms; extract of belladonna, from 10 grains to 2 drachms; ale or stout, from $\frac{1}{2}$ pint to a quart.

The *Lumbrici* prey upon the old and the weakly.

Treatment.—Tartarized antimony, 2 drachms; common mass, a sufficiency to make one ball. Give one every morning.



IRRITATION CAUSED BY WORMS. THE NOSE RUBBED VIOLENTLY AGAINST A WALL.

The *Strongulus*, during life, is generally not known to be present.

The *Ascarides* cause great itching posteriorly, which provokes the horse to rub its hair off against the wall.

Treatment.—Try injections of train-oil for one week. Then use infusion of catechu, 1 ounce to 1 quart of water. On the eighth morning, give aloes, 4 drachms; calomel, 1 drachm. Tobacco-smoke enemas are sometimes useful, and the following ointment may be placed up the rectum night and morning: Glycerine, $\frac{1}{2}$ ounce; spermaceti, 1 ounce; melt the spermaceti, and blend; when cold, add strong mercurial ointment, 3 drachms; powdered camphor, 3 drachms.

Wounds.—A *lacerated wound* is generally accompanied by contusion, but with little hemorrhage. Shock to the system is the worst of its primary effects. The danger springs from collapse. A slough may probably follow. The slough is dangerous in proportion as it is tardy. The horse may bleed to death if the body is much debilitated.



DIAGRAM OF A SEVERE LACERATED WOUND.



DIAGRAM OF AN INCISED WOUND.

Treatment.—Attend first to the system. Give a drink composed of sulphuric ether and laudanum, of each 1 ounce; water, $\frac{1}{2}$ pint. Repeat the medicine every quarter of an hour if necessary, or till shivering has ceased and the pulse is healthy. A poultice, made of $\frac{1}{4}$ brewer's yeast, $\frac{3}{4}$ of any coarse meal; or a lotion, consisting of tincture of cantharides, 1 ounce; chloride of zinc, 2 drachms; water, 3 pints, may be employed. When the slough has fallen, apply frequently a solution of chloride of zinc, 1 grain to the ounce of water; and regulate the food by the pulse.

An *incised wound* produces little shock. The danger is immediate, as the horse may bleed to death.

Treatment.—Do not move the horse. Dash the part with cold water, or direct upon the bleeding surface a current of wind from the bellows. When the bleeding has ceased and the surfaces are sticky, draw the edges together with divided sutures. When the sutures begin to drag, cut them across. After copious suppuration has been established, bathe frequently with the solution of chloride of zinc, one grain to the ounce of water.

An *abraded wound* generally is accompanied by grit or dirt forced into the denuded surface. The

pain is so great, the animal may sink from irritation.

Treatment.—Cleanse, by squeezing water from a large sponge above the wound, as was directed for broken knees, and allow suppuration to remove any grit that is fixed in the flesh. Support the body, and use the chloride-of-zinc lotion.

A *punctured wound* is dangerous, as the parts injured are liable to motion. On this account those above the stifle are very hazardous. Sinuses form from the torn fascia opposing the exit of the pus; also because the small hole in the skin generally bears no proportion to the internal damage.

Treatment.—Always enlarge the external opening to afford egress to all sloughs and pus. Regulate the food by the symptoms, and use the chloride-of-zinc lotion.

A *contused wound*, when large, causes more congealed blood than can be absorbed. This corrupts, and a slough must occur or an abscess must form. Either generates weakness, produces irritation, and may lead to fatal hemorrhage. Or sinuses may form. Don't judge hastily.

Treatment.—When the contusion is slight, rub the part with iodide of lead, 1 drachm of the salt to 1 ounce of lard. When large, divide the skin, every eighth inch, the entire length of the swelling. Bathe the injury with the chloride-of-zinc lotion, and support the body, as the



DIAGRAM OF AN ABRADED WOUND.

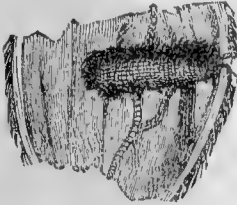
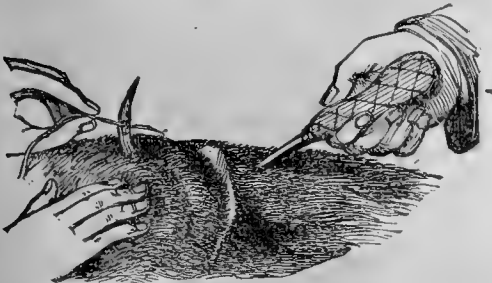


DIAGRAM OF A PUNCTURED WOUND.

The engraving supposes the soft parts to have been divided, in order to show the ragged nature and large extent of the injury, with the comparatively small opening by which this amount of harm is characterized.



DIAGRAM OF A CONTUSED WOUND.



THE MANNER OF USING THE FIXED SETON NEEDLE.

A second person pushes the wound together, and, when the point of the needle appears, threads it with a piece of zinc wire or soft string. The needle is then retracted, and released from the wire or string, whereby a suture is left in the wound.

symptoms demand liberality in the matter of food.

In all wounds, gain, if possible, a large depending orifice, and cover the denuded surfaces with a rag saturated with oil of, or in solution of, tar.

REMEDIES, AND THEIR ADMINISTRATION.

Warm Mash.—Put a peck of bran into a perfectly clean pail. Stir the bran as briskly as possible, and empty enough boiling water into the pail to render the contents a pultaceous mass. Cover up the vessel, and when cool throw the mash into the manger. Bran mashes, four daily, will relax the animal's system; but the groom likes to employ these agents merely as *preparatory* to his favorite dose of aloes; and, though repeated mashes will induce purgation in the equine patient, the groom is not satisfied unless that result be aggravated by a dose of aloes.

Bran mashes of themselves do not debilitate, though, from the length and size of the horse's intestines, purgation cannot be long maintained without inducing serious exhaustion; and it is never safe to work the animal while any looseness is observable. A tendency to inflammation is often announced by repeated liquid discharges; therefore, never let the horse be taken out while the bowels are in a state of excitement, for exercise may increase that action to one of positive disease. Bran mashes, however, are the safest and the gentlest of laxatives. Any condition may be induced, according to the number and frequency of the potions. In general, they act mildly, without inducing that bodily discomfort and that constitutional weakness which throw the animal out of condition and render rest an absolute necessity for recovery.

Horses not all Alike.—However, one horse will devour bran mashes with avidity; another will not touch them. This will not partake of the potion unless it be partially warm; another will not eat until it is perfectly cold; while most will partake of the mess if it be flavored by the admixture of a little salt or a few crushed oats. So, also, with water. Certain horses, when feeding upon bran mashes, refuse all drink; others enjoy frequent draughts of cold liquid; a third set seem to crave warm water; and a fourth will neither imbibe freely nor entirely abstain, being wholly indifferent as to the temperature of the liquid. Thus the order, which is often printed, to give to the horse, after the animal has swallowed a dose of aloes, copious draughts of warm water, is frequently rendered futile; for, as the proverb teaches, "one man may lead the horse to the pond, but forty men cannot make him drink."

Horse-Balls.—A horse-ball represents some substance in powder mixed into a mass with a moist ingredient, such as soft-soap, treacle, palm-oil, etc. The compounds, when united, are usually rolled into sticks about three quarters of an inch in diameter. These sticks are then cut into lengths of two and a half to four inches in extent, according to the amount required for a dose. They are generally sent to stables by the dozen. Physic is thus placed at the pleasure or the caprice of ignorance to administer. Aloes is the common purgative of the stable. So general was the use of the drug, that this medicine always took the precedence in every sickness, and engrossed to itself the significant term of "physic." "Has this horse had physic?" "Prepare this horse for physic"—when spoken in the stable, signify, Has he had aloes? or imply an order that another quadruped is to be prepared for a dose of aloes. An ignorant groom can only imagine that to be worthy of the title "physic," which is capable of producing visible effects; and, certainly, when judged by the stable-man's standard, aloes merits the distinction bestowed upon its drastic results.

Aloes.—On the other hand, aloes can, in no form, be administered to some horses. Many cannot take a full dose. Others can safely swallow the medicine only when highly spiced or in solution. A few are all but insensible to its action. Alarming spasms often follow the use of a moderate quantity of aloes, which always renders the quadruped sick ere the effects are visible. The drug, in most instances, lies dormant twenty-four hours, during which period the appetite is lost, the spirits oppressed, the coat dull, and the entire system evidently shaken. It is not esteemed prudent to work the patient till several days' rest have been allowed. It used once to be the custom to trot the animal which was sickening under a dose of aloes; but experience has shown the danger of the practice. The horse is now left in the stable, has an extra rug thrown upon his back, and a pail of warm water in the manger.

Very many animals, when suffering from chronic debility, may be slaughtered by a moderate dose of aloes, while many others never sufficiently recover from its effects to do a day's work after the medicine has ceased to operate. Of the preparations the veterinarian has at his command, it is one of the most dangerous. Another fact renders the aloetic ball an unsafe agent to be intrusted to the keeping of a groom. These things, as commonly compounded, become, in a short time, as hard as stones, and such bodies are not in a fit condition to be thrust down a horse's throat.

Previous to a ball being delivered it is cus-

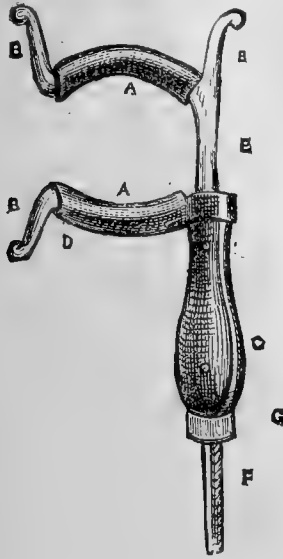
tomary to pinch the sharp edge of the forward end until it becomes rounded. The intention is so to modify the shape as to facilitate the passage of the body down the gullet. Whether the present practice in any degree is beneficial to the animal is doubtful: at all events, the horse would be more fortunate if the sharp edges of the forward extremity were the only danger it encountered from swallowing the physic.

Other Physics.—Several potent caustics rank among common horse-physics, as bichloride of mercury, arsenic, nitrate of silver, sulphate of copper, etc. These burning compounds are frequently administered in substance and in enormous doses. Even where the quantity prescribed is not objectionable, the form in which the caustic is generally given is highly injurious. The compounder does not bestow much care upon the accuracy of the weight—a scruple more or less being commonly esteemed of no importance. Then, small thought is bestowed upon the necessity of incorporating such fiery components with more mild ingredients before the mass is forced down the sensitive throat of a living creature. A ball made of linseed meal and treacle is taken; the powerful agent is speedily reduced to powder, and emptied into the cavity formed for its reception; and the whole, having been rewrapped in fresh paper, is esteemed ready. When such an article has been swallowed, the paper or covering is speedily removed by the action of the stomach. Then the burning mass falls out upon the fine, moist and velvet coat lining the viscus: this fact may explain why stomachic diseases are so general with the majority of old favorites. As such substances are caustics when applied to the external flesh, it is only reasonable to infer that no tissue within the body can long withstand their burning properties.

Balling-Iron.—We give the form of an instrument for administering balls, which seems free from the objections belonging to the old instrument, and to possess all the qualities that such an instrument can show. The restraining bars are formed of polished steel, and are covered with a stout piece of India-rubber tubing, thus in some measure protecting the mouth of the creature from injury by what hitherto was the exposed metal. The lower bar, moreover, is attached to the handle, and the handle can be readily raised or depressed by turning the nut situated at its base. It can be quickly adapted to any possible capacity of jaw.

The Old Way.—Such a form of immunity is, however, seldom sought. A sufficient security is in all ordinary cases afforded by the horse's tongue, which, when a ball is to be administered, is grasped by the left hand, and withdrawn to the right side of the mouth. The hand thus em-

ployed is fixed, being lightly pressed against the inferior margin of the lower jaw; for, when retained in such a position, the tongue is pressed upon the foremost of the huge molar teeth. Of course, the animal, thus held, cannot approximate its jaws so as seriously to harm the operator



NEW BALLING-IRON.

- A A. India-rubber tubing, to protect the mouth from the harshness of the metal bars.
- B B B. Side pieces to keep the iron in its situation.
- C. The handle.
- D. The lower bar, attached to the handle.
- E. The side piece, which can be raised or depressed.
- F. The screw, at the extremity of the side piece.
- G. The nut which, fastened to the handle, acts upon the screw and fixes its position.

without biting its own flesh; by that circumstance is safety supposed to be rendered certain. But should violence be exerted, animal fear is apt to be superior to bodily pain; the tongue and arm may be simultaneously bitten through. The



THE USUAL MANNER OF GIVING A BALL.

practiced veterinarian, however, takes advantage of the first emotion of surprise which the creature experiences at the liberties taken with it. Having the ball ready in the right hand, he, standing on the left side, quickly introduces the bolus into the wondering quadruped's mouth.

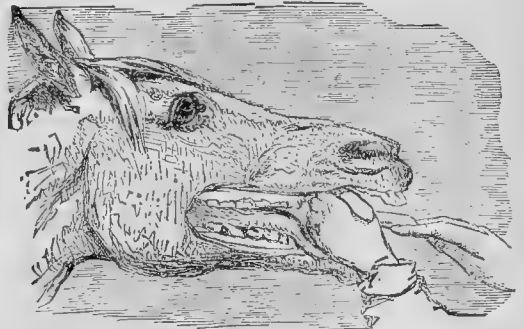
The medicine is lodged at the back part of the tongue, whence, as the horse does not expectorate, he cannot expel it, except by coughing. During the spasm which accompanies this act, the soft palate is raised and the ball is carried outward with the volume of violently-expired



THE CUSTOMARY MODE OF DISTRACTING THE HORSE'S ATTENTION, AFTER IT HAS RECEIVED A BALL.

breath. Some horses acquire a habit of thus returning all forms of physic, and will cough up a ball twenty times. This illustrates the necessity of distracting the attention of the quadruped the instant the hand is retracted; for in the confusion of the moment the most inveterate "dodger" may be surprised into swallowing any morsel.

The hand, during the delivery of the ball, being rapidly thrust into the mouth, is frequently cut by the sharp edges of the molar teeth. No knowledge can point out in advance the animal possessed of grinders of this dangerous description, and the only protection as yet suggested is to cover the hand with a glove. But the use of a glove is objectionable. The medicine being delivered, the hand is quickly withdrawn, and the jaws of the animal are clapped together. The nose is then rubbed somewhat roughly, with



NEW WAY OF ADMINISTERING A BALL.

the design of preventing the quadruped from dwelling too intently on the substance just forced into its mouth.

A New Way.—An excellent veterinary surgeon has endeavored to remove the objections to which the previous manner of delivering a ball is

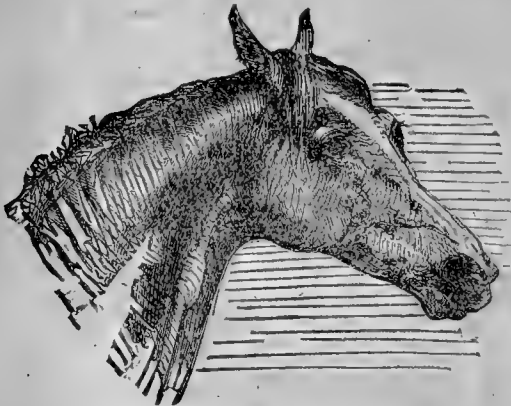
liable. He grasps the tongue rather higher up than usual; and does not retract it, but fixes it upon the gums which cover the upper margin of the lower jaw. The point of the tongue protrudes between the thumb and fingers, and it is then plain that the animal cannot close the mouth without biting upon its own flesh. Even this does not obviate the danger of the horse biting the hand through its own tongue.

The same gentleman proposes an unobjectionable method of delivering a ball. The knuckles



EXCELLENT MANNER OF DELIVERING A BALL.

are not elevated; but the hand is extended, the thumb and fingers being all brought upon one level and held close together. The ball is placed between the fore and middle fingers, and retained simply by slight lateral pressure. In this position it is introduced, and evidently demands less space for its entrance than was required according to the former system. When the ball has been advanced to the desired situation, a separation of the fingers allows it to drop into place. Veterinary surgeons, however, soon learn to give a ball with greater speed and less



A BALL PASSING DOWN THE HORSE'S GULLET.

ceremony. They go alone up to the head, and play for a time with the quadruped's face. Confidence being thus established, the practitioner gently withdraws the creature's tongue. Thus the jaws are sundered; when, without flurry, the hand is introduced into the cavity and the medicine properly lodged.

The physic being introduced into the mouth, the person who has undertaken to deliver it should on no account esteem his business finished. He should watch the neck. In that

position, when the animal swallows, any substance can be seen to travel down the gullet; this proof having been had, the horse may be left.

Drinks or Draughts. — Sometimes veterinarians pour liquids down the nostril of the horse. The nostrils terminate immediately over the larynx, and any fluid administered after so unnatural a method will probably find its way on to the lungs. Veterinary medicines are too generally composed of pungent and of caustic materials, while the nostrils are lined with a highly sensitive and delicately moist mucous membrane. The nostril was created to come in contact with the air, to which it affords the only legitimate passage. The notion of disregarding the mouth and selecting so tender a channel,



THE CONSEQUENCE TO BE EXPECTED WHENEVER THE CRUEL CUSTOM OF POURING DRINKS INTO THE NOSE OF A HORSE IS ADOPTED.

a a. The windpipe. *b b.* The gullet. *c c.* The soft palate. *d d.* The tongue.

down which to pour acid and burning solutions is a refinement upon ordinary barbarity.

Process of Drinking. — The natural process through which the horse drinks is as follows: Its mouth is peculiar in that it has at its backward extremity a fleshy screen, hanging from the bony roof. This soft palate explains why the quadruped, under ordinary circumstances, breathes only through the nose; and why, when it vomits, the matter is ejected through the nostrils. That specialty is of service, however, during the act of drinking. The posterior entrance to the nasal chamber being open and the head in a pendulous position, were there no special provision to the contrary, the water, after having passed the mouth, would, from the mere force of gravity, have a tendency to return by the nostrils. This actually occurs whenever cold, strangles, influenza, sore throat, or their like, interferes with the use of these parts. Disease renders the organ sensitive, and the animal exerts its volition to prevent the employment of the inflamed structure. The nasal chambers are imperfectly closed, and a great portion of the fluid imbibed by the mouth flows out again

through the nostrils. Such a tendency is, during health, effectually prevented by the soft

be raised, and its rising closes the posterior entrance to the nasal chambers.

Tongue and Mouth.—The tongue is the primary agent employed when the animal slakes its thirst. The backward portion of the organ is contracted, and the forward part compressed by muscular volition. A vacuum would thereby be created, were not the water propelled by atmospheric pressure into the void thus formed. The posterior of the tongue is then relaxed, while the anterior division of the organ is pressed against the roof of the mouth. The fluid is thereby driven to the backward part of the cavity. The tongue, during the act, continues to alternate the states of contraction and relaxation, each motion serving to pump the water into the fauces. But, before that can be accomplished, the soft palate must be elevated. The soft palate then closes the nostrils, and also in its course to take this position sets in motion the cartilages of the larynx. The last covering and effectually protecting the windpipe, the fluid is forced onward by the contraction of the tongue, passes into a secure chamber, the roof and floor of which are but of temporary formation. Here it remains only during the inactivity of the larynx. The upward motion of the latter body propels the fluid into the pharynx, whence contractility sends it into the gullet, the muscular action of which conveys it onward to the stomach.

Giving Draughts.—A common method is depicted above, where a loop of string is hung



A TIN BOTTLE TO HOLD THREE PINTS. THE MANNER OF USING THE TIN BOTTLE.

upon the prong of a pitchfork. Should the operator fill the mouth too-full, or the animal cough during the time of its administration, he is saturated with the medicine. Any irritation of the larynx is invariably productive of this effect. The misfortunes which the delivery of drinks almost necessarily involves, will very readily account for dislike to the fluid form of medicine. The danger that exists of the horse coughing and spasmodically drawing the fluid upon the lungs, constitutes the strongest argument urged against the administration of drinks.



DIAGRAM (FIG. 1) EXPLANATORY OF THE COMPOUND ACT OF DRINKING IN THE HORSE.

a a. The water drawn into the mouth and forced into the fauces by the compression of the forward part of the tongue and the enlargement of the backward portion of the organ. *b b.* The fluid passing down the œsophagus or gullet. *c.* The larynx, lowered to admit the passage of the liquid. *d d.* The tongue, dilated at one place and contracted at another. *e.* The soft palate, floated upward and effectually closing the nasal passages.



DIAGRAM (FIG. 2) EXPLANATORY OF THE COMPOUND ACT OF DRINKING.

a a. The water driven backward by the forward dilatation of the tongue and the upward movement of the larynx. *b b.* The full current forced down the gullet. *c.* The larynx propelled against the soft palate. *d d.* The tongue, dilated anteriorly and compressed posteriorly. *e.* The soft palate.

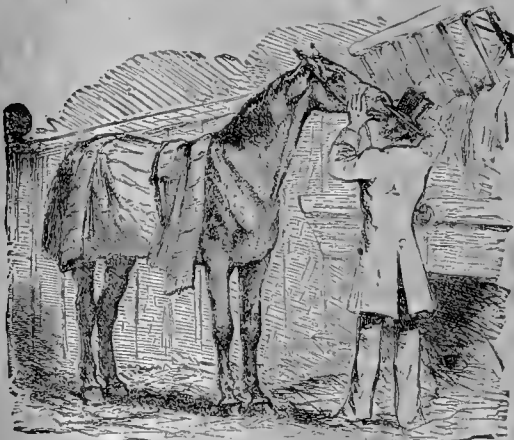
palate. Before any substance can pass from the mouth toward the throat, that appendage must

Let the person who intends to deliver a drink fearlessly approach the animal: allow him to smell his new acquaintance, and not till then proceed to such trivial familiarities as may establish trustfulness between the two. As soon as the steed's confidence is gained, he is all submission. Then uncork the bottle, and, putting the left hand



GENERAL METHOD OF ADMINISTERING A DRINK TO A HORSE.

gently under the quadruped's jaw, empty with the other the contents, gradually, through the interspace which divides the incisors from the molar teeth. But the operator must be alone. No pain must be inflicted; no angry words employed; no violent or hasty action, used to frighten the horse. Should the animal be slow to swallow a nauseous draught, he must not be scolded for a natural



GIVING A DRINK, ACCORDING TO THE QUIET METHOD.

dislike; but should be encouraged by kind and cheerful accents, spoken as softly as though the words were addressed to a sick child;

Blisters.—The use of blisters is founded upon a maxim enunciated by the celebrated Dr. John Hunter, that "two great inflammations cannot exist in the same body at the same time." With this view, stimulating acrimonious substances are

applied to the skin, to excite external inflammation, and to lessen or draw away inflammation in some deeper-seated, and generally not far-distant, part. Thus we blister the sides, in inflammation of the lungs; the belly in that of the bowels; the legs in that of the cellular substance surrounding the sheaths of the tendons, or the sheaths themselves; and the coronet or the heel in inflammation of the navicular-joint. Mayhew, however, teaches: "Let no man blister a horse's legs. There is no motor agent situated in or near to those parts. The shin, foot and pastern are almost without muscles. There is nothing, therefore, which could be freshened or rendered more brisk. But these parts are susceptible of the acutest agony. They are largely supplied with purely sensitive nerves. Consequently, let all gentlemen discharge the veterinary surgeon who proposes to blister the legs of their horses." He also denounces the employment of hot iron on a horse, and declares that blisters, as usually employed, are far too powerful.

Blisters have likewise the property of increasing the activity of the neighboring vessels: thus we blister to bring the tumor of strangles more speedily to a head; we blister to rouse the absorbents to more energetic action, and take away tumors, and callous and even bony substances. The judgment of the practitioner will decide when the desired effect will be best produced by a sudden and violent action, or by a longer and milder one. Inflammation should be met by active blisters; old enlargements and swellings will be most certainly removed by milder stimulants—by the process which farriers call *sweating down*.

There is no better blister ointment or active blister than the Spanish fly, mixed with four parts of lard and one of resin. The lard and the resin should be melted together, and the powdered flies afterward added. Perhaps the best liquid or sweating blister is an infusion of the fly in turpentine, and that lowered with neat's-foot oil according to the degree of activity required.

In preparing the horse for blistering, the hair should be clipped or shaved as closely as possible, and the ointment thoroughly rubbed in. Much fault is often found with the ointment, if the blister does not rise, when the real blame should be attributed to the idleness of the operator. The head of the horse must be tied up for the first two days, except that when the sides are blistered, the body-clothes may be so contrived as to prevent the horse from nibbling and blemishing the part, or blistering his muzzle. At the expiration of twenty-four hours, a little olive or neat's-foot oil may be applied over the blister, which will considerably lessen the pain and soften the part, and prevent cracks in the skin that may be diffi-

cult to heal. The oil should be applied morning and night, until the scabs peel off. When they begin to loosen, a lather of soap and water applied with a sponge may hasten their removal; but no violence must be used. All litter should be carefully removed from the stall; for the sharp ends of the straw, coming in contact with a part rendered so tender and irritable by the blister, will cause very great annoyance to the animal. After the second day, the horse may be suffered to lie down; but still, the possibility of blemishing himself should be prevented by a *cradle*, or wooden necklace, consisting of round strips of wood strung together, reaching from the lower jaw to the chest, and preventing the horse from sufficiently turning or bending his head to get at the blistered part.

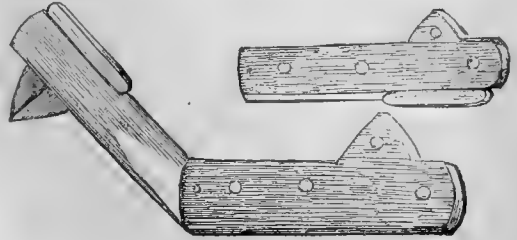
A blister thus treated will rarely produce the slightest blemish. When the scabs are all removed, the blister may be repeated, if the case should appear to require it, or the horse may be turned out.

In inflammations which threaten life, a blister can scarcely be too active or too extensive. In inflammation of the lungs, it should reach over the whole of the sides, and a greater part of the brisket; for should a portion of the fly be absorbed, and produce *strangury* (inflammation, or spasmodic affection of the neck of the bladder), even this new irritation may assist in subduing the first and more dangerous one; but in blistering for injuries or diseases of the legs or feet, caution is necessary. A blister never should be used while any heat or tenderness remains about the part; for we should then add to the superficial inflammation, instead of abating the deeper-seated one; and enlargements of the limb and ulcerations might follow, which would ruin the horse. When there is a tendency to grease, a blister is dangerous, and has often aggravated the disease. In winter, the inflammation of the skin produced by blistering is apt to degenerate into grease; therefore, if it should be necessary to blister the horse during that season, great care must be taken that he is not exposed to cold, and, particularly, that a current of cold air does not come upon the legs.

Bleeding.—This practice was a few years ago as general in the treatment of horses as of men. Sheds full of horses used to be bled, each horse in turn, on general principles: as the New England mother a couple of generations ago and Mrs. Squeers were wont to administer “brimstone and treacle,” *alias* “sulphur and molasses,” to the children at stated times, not because anything ailed them, but because the mess was “good for the blood.” The bleeding of human beings has become nearly obsolete; and that of lower animals is fast following suit. Still, high veterinary

authorities do not quite give it up. Mayhew says: “Nevertheless it is possible that a timely depletion may, upon certain occasions, save life.” Youatt has not a word against it. Another authority: “Still, bleeding is valuable in cases of congestion, when there is a full, strong pulse and no weakness, but only in the first stage—never when the temperature of the patient is abnormally high and the system has become weakened.”

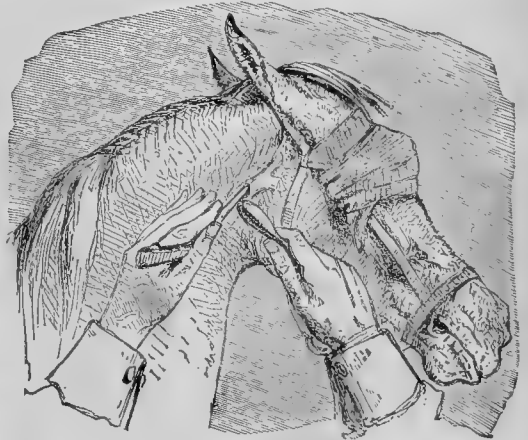
The instruments needed are a fleam, or horse-lancet, and a pail. The pail may be a two-gallon



FLEAM, OPEN AND SHUT.

one, marked by lines into eight equal sections, each section holding a quart. One or two quarts is the limit of an ordinary bleeding. Authorities tell of a “bloodstick,” which is unnecessary, as the fist is just as good.

For general bleeding the jugular vein is selected. The horse is blindfolded on the side on which he is to be bled, or his head turned well away; the hair is smoothed along the course of the vein with the moistened finger; then with the third and little fingers of the left hand, which holds the fleam, pressure is made on the vein sufficient to



BLEEDING.

bring it fairly into view, but not to swell it too much, for then, presenting a rounded surface, it would be apt to roll or slip under the blow. The point to be selected is about two inches below the union of the two portions of the jugular at the angle of the jaw. The fleam is to be placed in a

direct line with the course of the vein, and over the precise center of the vein, as close to it as possible, but its point not absolutely touching the vein. A sharp rap with the bloodstick (as in the cut) or the hand on that part of the back of the fleam immediately over the blade, will cut through the vein, and the blood will flow. A fleam with a large blade should always be preferred, for the operation will be materially shortened, which will be a matter of some consequence with a restive horse; and a quantity of blood drawn speedily will have far more effect on the system, than double the weight slowly taken; while the wound will heal just as readily as if made by a smaller instrument.

When the blood begins to flow, it should be received in the pail already mentioned, which is



HOLDING THE PAIL.

pressed against the horse's neck, thereby impeding the downward stream within the vessel and causing the blood to gush out.

When sufficient blood has been taken, remove the pressure below the orifice and the outward stream will cease. Then put a pin through each side of the wound, and twist, after the fashion of a figure of ∞ , some tow or thread, or a hair pulled from the horse's tail, round each end. Subsequently remove so much of the pin as may protrude, and the orifice will be closed by what surgeons denominate a twisted-



TWISTED SUTURE.

ed suture. The head of the horse should be tied up for several hours, to prevent his rubbing the part against the manger. In bringing the edges of the wound together, and introducing the pin, care should be taken not to draw the skin too much from the neck, as blood will insinuate itself between the skin and the muscles beneath, and cause an unsightly and sometimes troublesome swelling. Twenty-four hours after the operation, the edges of the wound will have united, and the pin should be with-

drawn. When the bleeding is to be repeated, if more than three or four hours have elapsed, it will be prudent to make a fresh incision rather than to open the old wound.

OTHER METHODS OF TREATMENT.

As would naturally be expected, there are various theories and systems of treating ailing horses. Patent-medicine men have not neglected him; and offer unnumbered remedies as certain speedily to relieve him of every possible ailment, as are the countless nostrums certified to be equally efficacious in the case of his human brethren. Nor has Homeopathy overlooked him: *Similia Similibus Curantur* offers its priceless discoveries to dumb as well as to speaking animals; and a diminutive medicine-chest, with numbered specifics, is heralded as sufficient for the largest stable, with perhaps a call on the homeopathic practitioner in an extreme case.

The Turkish Bath.—David Urquhart, who was mainly instrumental in the introduction of the Turkish Bath into Western Europe, whence it long ago emigrated to the United States, had great faith in its benefits to lower animals, notably horses and cattle, as well as to men. As long ago as 1865, Dr. Sir John Fife compiled and published from Mr. Urquhart's writings a book entitled "*Heat a Mode of Cure and Source of Strength to Men and Animals.*" In this the action of the Bath on a farm is described and commended, and many instances are given of the wonderfully good results following its application. His theory is, that the horse, who is indigenous to high and cold regions, but nevertheless flourishes in hot and dry zones, should not be housed and cuddled as if he were a sick infant, but needs pure heat and cold. He says: "A large portion of food is expended on the production of animal heat. The smaller the size of the animal, the larger is the surface in proportion to its bulk, and therefore the greater the escape of heat. A canary-bird in proportion to its size and weight consumes many times as much food as a man. Heat escapes far more rapidly from the man than from the horse. The effect, then, in the form of saving food, is for the horse very considerable. It is thus that the horse is enabled to inhabit the regions adjoining the limits of eternal snow. Consequently heat, externally applied to him, has so much greater power than in man. In the cold regions of Tartary, or the hot ones of Persia, Mesopotamia, the Nedjd, or the African deserts, he is severally brought to the highest perfection by heat or cold. I look therefore to the Bath as capable of furnishing a finer breed of horses than has as yet been obtained." He denounces the currycomb as a

stupid and cruel instrument to remove the scurf-skin, and claims that by the bath—

Its Results.—“The skin is cleansed far more completely than by any other method of grooming; the system relieves itself, through the skin, of every kind of impurity; the animal is enabled to bear, with perfect impunity, the greatest alternations of heat and cold; the appetite, so frequently a poor one in training, is increased, and digestion promoted; the lungs are brought into strong play, without increased action of heart and pulse,” etc., etc.

A friend tells of a visit he made to a farm near Dublin, where the Turkish Bath was given once a week to the horses and cattle, regularly, not waiting for them to get out of order, but as a tonic and preventive of sickness. The proprietor said that he could tell by the appearance of his stock, if they had been deprived of this hygienic appliance.

In the stables of the *Third Avenue Railroad Company*, New York, where some 2000 horses are kept, a Turkish Bath was introduced early in 1882, and is still in successful operation. A reporter from the *Times* “interviewed” the Bath and Dr. Hough, and we will freely borrow his language. “A space about as large as six or eight ordinary stalls, has been tightly inclosed, with thick board walls, floor and ceiling. The floor is covered with movable slats, and under these are steam-pipes by which the temperature can be run up to 100°, 150° or 200°, at the will of the operator. In front of two of the stalls are small square windows, each large enough for a horse to put his head through. These windows can be closed with board shutters, and they are all provided with heavy curtains opening in the center. When it is desirable to give a horse a very hot bath in a room whose temperature must be higher than the horse could breathe with comfort, the window is opened, and the horse, with his body in the bath, puts his head out into the cold air. The curtains are then drawn tight about his neck, to prevent the heat from escaping, and the horse has all the luxury of a Turkish Bath without the inconvenience of breathing the overheated air. Horses requiring treatment are left in the bath from twenty minutes to an hour, and are then washed with tepid water and thoroughly scrubbed. After being groomed till he shines like a new sealskin sacque, a horse on coming out of the bath is taken into the cooling-room and kept there an hour or more, the temperature being lowered gradually till it is the same as in the body of the stable. When this point is reached, the horse is ready to be taken back to his stall, and is to all intents a new animal.

Other Baths.—In these stables, out of the 2000 horses, there will be 50 to 100 ailing, and the

Russian and Electric baths are also employed. In the Russian baths, the steam is let out of the pipes into the room, till the atmosphere is wet enough to bottle. Here the horses sometimes rebel, but do not make any vigorous resistance. Several horses, too sick to stand up, have been treated. For their accommodation there is a stout blanket, fastened to ropes running through pulleys in the ceiling. The blanket is put under the horse's body, the ropes are tightened, and he takes his bath swinging in a hammock.

Dr. Hough tells of one of the best horses in the stable that had a very severe attack of pneumonia. Her pulse was extremely high, and she had a dangerous rattling in the bronchial tubes. He put her in the Russian bath, and kept her in nearly all the afternoon, reducing the temperature gradually. She perspired very freely, and when she was taken out of the bath the rattling was entirely gone. The next day the mare was much better, and the bath was repeated. On the third day she was given another bath, and when she came out her pulse, respiration and temperature were normal. At the end of a week she was entirely well and was put to work. For pink-eye, which is an aggravated form of influenza, with bronchial troubles, the baths are very efficacious. A horse was put in with his eyes entirely closed and a heavy discharge of white mucus from eyes and nostrils. On the day following the first bath, the swelling was greatly reduced, and the discharge had disappeared. Horses have also been successfully treated for founder.

For strains, sprains and various other ailments, electric baths are given. The horse to be treated with electricity is put into the warm room and is well rubbed down with sponges attached to electric wires. The animals do not quite know what to make of the electric shock, but take kindly to it after a little experience.

In every material point these baths are precisely similar to those provided for men and women. The horses are heated to a high point, deluged with water, thoroughly kneaded, slowly cooled off, the batteries being capable of giving a shock that could make any human being “squirm.”

A Cynic.—We asked a well-known trainer and driver, “Do you ever bleed your horses?” “Never bleed a horse.” “How do you manage when an animal gets out of order?” “If it is hot and has fever, I blanket it heavily and sweat it off. Otherwise I stop its feed and let it get well, as I do in my own case.” “Don't you call in a vet.?” “Sometimes, if I am sure the horse is going to die, anyway.” Of course, this trainer did not expect his words to be taken literally. But undoubtedly there is too much, rather than too little, heroic treatment given to horses.

MULES AND ASSES.

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An Illogical Order.—Assuredly these names are not printed in logical order. But the United States Census seems right in putting the Mule before the Ass. For the latter animal, like the drone among the bees, derives his value, not from the farm use to which he can be personally put, but, from his power, in union with a female not of his own lineage, of producing offspring that shall in certain respects surpass either of its parents. The mule, like the worker-bee, again, is an alien to the joys and sorrows of parentage, his, her or its line always ending with him, her or it. And unlike the worker-bee, there is no stage of existence where any change of cell or stimulus of food can make of him other than he is. To be sure, the mule is apparently of one or the other gender; but the appearance is not a reality.

Hybridism.—The Latin word *hybrida*, or *hibrida*, a hybrid or mongrel, is commonly derived from a Greek word, *hubros*, an insult or outrage, with special reference to lust. As a general rule, plants and animals belonging to distinct species are not able, when crossed with each other, to produce offspring. There are, however, innumerable exceptions to this rule; and hybridism is the word employed to denote those exceptions. It is an abstract term which signifies the more or less fertile crossing of distinct species. In scientific usage the term "hybrid" is exclusively reserved to denote the result of a fertile cross between two distinct species, while the term "mongrel" is the one which is exclusively reserved to denote the result of a fertile cross between two varieties of the same species.

See Darwin.—Of late years the subject has acquired a high degree of scientific interest in relation to the theory of descent. On this account it has been so carefully and thoroughly treated by Mr. Charles Darwin, that any one inclined and able to pursue this most interesting line of investigation cannot do better than to study his writings, and especially his two volumes, *Variations of Animals and Plants under Domestication*. The hybrid produced by the union of the male ass, or jack, and the mare, is called a

mule (Latin *mulus*); while that produced by the union of a stallion with a she-ass, or jenny, is called a hinny (Latin *hinnyus*).

The Ass.—The domestic ass, *Asinus vulgaris*, differs chiefly from the horse in its smaller size, in the presence of long hair, forming a tuft, only at the extremity of the tail, and in the absence of warts on its hind legs. Its fur, usually of a gray color, is characteristically marked with a longitudinal dorsal streak of a darker hue, with a similar streak across the shoulders; but white and black varieties also occur. The ass has been from time immemorial under the dominion of man, and it is doubtful whether the original wild stock is anywhere to be found at the present day,—the specimens that have been described as wild being probably the descendants of individuals escaped from the domestic state. A wild variety of ass (*Asinus taniopus*), found in Abyssinia, has the long acute ears and the bray peculiar to the domestic kinds. It is said also to have cross-bands on its legs, a feature occasionally met with in our tame breeds; and this fact has led Darwin and others to conclude that in the wild ass of Abyssinia the original of the domestic animal is to be found; the stripes which occasionally appear on the legs of the latter being regarded as instances of reversion to the ancestral type. The marked aversion of the domestic ass to cross the smallest streamlet, an aversion which it shares with the camel, and the evident delight with which it rolls itself in the dust, seem to point to arid deserts as its original home.

The Ass Improvable.—That the ass possesses qualities which, if developed by careful selection and humane treatment, would make it a worthy companion of the horse as the servant of man, is seen in the two rare instances in which it has received proper attention. In Southern Europe, especially in Spain, Sicily and Malta, the ass is carefully bred, and has been thus greatly improved, a single animal sometimes bringing \$1000. In our own Southern States, where mules are, as we have seen, greatly used, asses, imported from the South of Europe, are reared

with scrupulous care, and with corresponding results. But in the north of India, where it is used by the lowest castes, the ass does not attain a height greater than that of a Newfoundland dog.

In Egypt and Syria.—It is, however, among the southwestern nations of Asia and in Egypt that the ass has received that attention usually bestowed in Great Britain and the United States on the horse, and it is there to be seen in its greatest perfection. The Arabs and Persians know the pedigree of their asses, and by careful selection and interbreeding they have formed and perpetuated many useful races. Thus in Syria, according to Darwin, there are four distinct breeds: "a light and graceful animal with agreeable gait used by ladies, an Arab breed reserved exclusively for the saddle, a stouter animal used for plowing and various purposes, and the large Damascus breed—with peculiarly long body and legs."

The Wild Ass:—The koulan, or wild ass (*Asinus onager*), differs from the domestic species in its shorter and more rounded ears, and in the greater length and finer form of its limbs. Its fur shows the dark streak along the back, but the streak across the shoulders does not appear to be a constant character. It is chiefly to be met with in the plains of Mesopotamia, in Persia, in Cutch, on the shores of the Indus, and in the Punjab, congregating in herds under a leader, and migrating southward on the approach of winter. The adults are exceedingly shy, so that it is difficult to get within rifle-range of them. According to Layard, who had ample opportunity of observing them during his researches around Nineveh, "they equal the gazelle in fleetness, and to match them is a feat which only one or two of the most celebrated mares have been known to accomplish." In the same region, over 2000 years ago, Xenophon, during the famous expedition of Cyrus, observed herds of wild asses so "fleet that the horsemen could only take them by dividing themselves into relays, and succeeding one another in the chase." They are hunted chiefly by the Arabs and Persians, by whom their flesh is esteemed a delicacy. Their food, according to Dr. Shaw, consists mainly of saline or bitter and lactescent plants; they are also fond of salt or brackish water.

Asses' Milk.—The milk of the ass, containing more sugar and less caseine than that of the cow, chiefly resembles woman's milk, and has long been valued as a nutritious diet where the digestive organs are weak. Its usefulness in cases of consumption has been long known, and it was often prescribed as a sort of specific when that disease was treated on principles very different from those which regulate its treatment now,

and when very nutritious food was not usually prescribed for consumptive patients.

The sexual power of both the jack and the jenny is great. In each of the hybrids produced by the union of ass and horse, the ass nature predominates. The mule is an ass modified by the strain of a horse, and brays like its sire.

Washington's Jacks.—Gen. Washington received as a present some Spanish jacks, of which Mr. Custis has written:

"The *Royal Gift* and *Knight of Malta* were sent to Gen. Washington about the year 1787—the *Gift* with a jennet, a present from the King of Spain; and said to have been selected from the royal stud. The *Knight*, I believe, was from the Marquis de Lafayette, and shipped from Marseilles. The *Gift* was a huge and ill-shapen jack, near sixteen hands high, very large head; clumsy limbs, and to all appearance little calculated for active service; he was of a gray color, probably not young when imported, and died at Mount Vernon, but little valued for his mules, which were unwieldy and dull. The *Knight* was of a moderate size, clean-limbed, great activity, the fire and ferocity of a tiger, a dark brown, nearly black color, white belly and muzzle; could only be managed by one groom, and that always at considerable personal risk. He lived to a great age, and was so infirm toward the last as to require lifting. His mules were all active, spirited and serviceable; and from stout mares attained considerable size.

"Gen. Washington bred a favorite jack called *Compound*, from the cross of Spanish and Maltese—the *Knight* upon the imported Spanish *Jennet*. This jack was a very superior animal: very long-bodied, well set, with all the qualities of the *Knight* and the weight of the Spanish. He was the sire of some of the finest mules at Mount Vernon, and died from accident. The General bred mules from the best of his coach mares, and found the value of the mule to bear a just proportion to the value of the dam. Four mules sold; at the sale of his effects, for upward of \$800; and two more pairs at upward of \$400 each pair; one pair of those mules were nearly sixteen hands high. From these jacks a compound breed were produced, that when bred to large mares, were unexcelled for size and activity."

The Mule in History.—The Levitical law prescribed: "Thou shalt not let thy cattle gender with a diverse kind." But as through the Old Testament are scattered allusions to the presence of mules, back to the 35th chapter of Genesis, where we read of: "Anah that found the mules in the wilderness, as he fed the asses of Zibeon his father;" it seems plain, either that this Levitical precept was not as old as Anah, that the

seed of Abraham disregarded it, or that themselves not violating the rule, they got hold of mules bred by men who were not "under the law." So that at a very early period, judging from sacred history, the crossing of the ass and the horse must have been practiced. Mules are mentioned also in profane history, having been introduced in chariot-races five centuries before Christ. Pliny records that a Roman senator paid 400,000 sesterces (about \$10,000) for one; and that the best she-asses were worth a like sum, to breed sires from. In ancient times the sons of kings rode on mules, and they were yoked in chariots.

In the United States, To-day.—It is sometimes asserted that since the abolition of slavery, the mule industry has languished. But a glance at the census of mules and asses exhibited in the Table on p. 207, will show that although this statement seemed justified by the census of 1870, that of 1880 negated it. The number, 559,331 in 1850 rose to 1,151,148 in 1860, or about doubled, and fell back to 1,125,415 in 1870. But in the great revival of industry and business in the ex-slave States which set in about 1876, this department shared; and the number of mules and asses had again risen in 1880 to 1,812,808. The common impression that the mule's usefulness is to be found south of 40° of latitude, is borne out by the facts as recorded in the Tenth Census; where of the 1,812,808, only about 100,000 are found in States north of that parallel. It is not improbable that the next census may show a still greater proportionate increase in the number of these comparatively humble helpers. The Poiteau ass is the one which stands in the highest estimation for mule-production.

The Mule's Longevity.—One of the stock maxims said to be derived from the experience of the civil war, is that "mules never died." That may do as a figure of speech to rank with the nine lives of a cat. In a record kept of Mules Received, Died, and Shot, at the Depot in Washington, D. C., for about three years beginning with February 1863; out of 119,968 received, 2733 were reported as having died, and 3931 as having been shot; and as often the same animals must have gone out and come back, the 120,000 is probably greatly in excess of the number of animals. But there seems no doubt that the average longevity of a mule largely exceeds that of a horse.

His Especial Value.—In addition to the much longer period for which the labor of a mule may be used, there are other peculiarities in which he excels the horse. In intense heat the mule will stretch himself out and bask in the sun, where a horse would need and seek shelter. He is not of so sensitive a nature as the horse, and

will bear pain, or at least what we suppose will produce pain, without showing it in lameness. This same lack of sensitiveness also enables the mule to keep about his business, where a horse will fret, take fright, and try to run. Nor is the mule liable to contract the habit of running away, as the horse may. He will get frightened, and he will run away, but he will not lose all his senses as the horse does. "Bring a mule back after he has run away, and in most cases he will not want to do it again. Their sluggish nature does not incline them to such tricks."

Natural Kickers.—However a mule may be bred, as soon as he can stand up, if you put your hand on him, he will kick. It is his natural means of defense, and he resorts to it through sheer instinct. Riley says "they will all kick, especially if well fed and rested. And we can excuse even this vice in consideration of the fact that the mule is not a natural animal, but only an invention of man. Some persons are inclined to think that, when a mule is a kicker, he has not been properly broken. I doubt if you can break a mule so that he will not kick a stranger at sight, especially if he be under six years old. The only way to keep a mule from kicking you is to handle it a great deal when young, and accustom it to the ways and actions of men. You must through kindness convince it that you are not going to harm or abuse it, and you can do that best by taking hold of it in a gentle manner every time it appears to be frightened. Such treatment I have always found more effective than all the beating and bruising you can apply."

A Bad Name, Undeserved.—The notion that a mule is not totally depraved, and that he will answer to humane treatment and kindness, will probably provoke an incredulous smile in the average reader. Nevertheless, the idea of his innate and ineradicable viciousness is only one of the hallucinations which hang around the mule. On the average, according to all intelligent and instructed testimony, he will treat you very much as you treat him. We cannot do better than to quote again from "*The Mule: a Treatise on the Breeding, Training and Uses to which he may be put.*" By Harvey Riley, Superintendent of the Government Corral, Washington, D. C. New York: Dick & Fitzgerald.—a book full of interest and instruction, written by a gentleman whose opportunities for acquaintance have been exceptionally good, and as exceptionally well used. He says:

"Probably no animal has been the subject of more cruel and brutal treatment than the mule, and it is safe to say that no animal ever performed his part better, not even the horse. In breaking the mule, most persons are apt to get out of patience with him. I have got out of pa-

tience with him myself. But patience is the great essential in breaking, and in the use of it you will find that you will get along much better. The mule is an unnatural animal, and hence more timid of man than the horse; and yet he is tractable, and capable of being taught to understand what you want him to do. And when he understands what you want, and has gained your confidence, you will, if you treat him kindly, have little trouble in making him perform his duty." And again: "He is, I admit, what may be called a tricky animal; for experiment's sake, just play one or two tricks with him, and he will show you by his action that he understands them well. Indeed, he knows a great deal more than he generally gets credit for, and few animals are more capable of appreciating proper treatment."

A Curious Fancy.—Mr. Riley: "Mules of all kinds seem to have a peculiar fancy for white mares and horses, and when this attachment is once formed, it is almost impossible to separate them. If you want to drive a herd of 500 mules any distance, turn a white or gray mare in among them for two or three days, and they will become so attached to her that you may turn them out, and they will follow her anywhere. Just let a man lead the mare, and with two men mounted you can manage the whole herd, almost as well as if they were in a team. Another way to lead mules is to put a bell on the mare's neck. The mules will listen for that bell like a lot of school-children, and will follow its tinkling with the same instinct."

Breeding.—The same author disagrees with much of the usual advice about the selection of mares from which to get mules. He does not favor large animals, either dam or offspring: "Of all the number we had in the army, I never saw six of these large, overgrown mules that were of much service. Indeed, I have yet to see the value in any animal that runs or rushes to an overgrowth. The same is true with man, beast or vegetable. I will get the average size of either of them, and you will acknowledge the superiority. The only advantage large mares may give to the mule is in the size of the feet and bone that they may impart. The heavier you can get the bone and feet, the better. And yet you can rarely get even this, for the mare, in nineteen cases out of twenty, breeds closely after the jack, more especially in the feet and legs. It makes little difference how you cross mares and jacks, the result is almost certain to be a horse's body, jack's legs and feet, a jack's ears, and, in most cases, a jack's marks." He prefers to breed from sound, serviceable, compact and spirited mares. And yet, apropos of the last adjective he says: "I have seen frequent instances where one of the very best jacks in the

country had been put to mares of good quality and spirit. Putting them to such contemptible animals seemed to degrade them, to destroy their natural will and temper. The result was a sort of bastard mule, a small-legged, small-footed cowardly animal, inheriting all the vices of the mule and none of the horse's virtues—the very meanest of his kind." This looks as though the mare felt the force of what the Greek root of the word *Hybridism* expresses.

Training.—Here the same general principles apply as in the training of the horse. At an early age confidence must be established between the man and the animal, and the latter be shown and led to do what is required of him. In either case the pupil must learn obedience, and that obedience must be enforced. The whip will hardly be more necessary with the young mule than with the young horse, and is in either case as much as possible to be avoided. "When the colt is six months old, put a halter on him and let the strap hang loose. Let your strap be about four feet long, so that it will drag on the ground. The animal will soon accustom himself to this; and when he has, take up the end and lead him to the place where you have been accustomed to feed him. This will make him familiar with you, and increase his confidence. Handle his ears at times, but don't squeeze them, for the ear is the most sensitive part of this animal. As soon as he lets you handle his ears familiarly, put a loose bridle on him. Put it on and take it off frequently. In this way you will secure the colt's confidence, and he will retain it until you need him for work."

Keep your Temper.—"Don't fight or abuse him. After you have harnessed him, and he proves to be refractory, keep your own temper, slack your reins, push him round, backward and forward, not roughly; and if he will not go, and do what you want, tie him to a post and let him stand there a day or so without food or water. Take care, also, that he does not lie down, and be careful to have a person to guard him, so that he does not foul in the harness. If he will not go, after a day or two of this sort of treatment, give him one or two more of it, and my word for it, he will come to his senses and do anything you want from that time forward."

Feeding and Grooming.—"The mule, properly taken care of, requires nearly as much forage as the horse, and should be groomed and cared for just the same. . . . When I find animals in the Government possession, that cannot eat the amount necessary to sustain them and give them proper strength, I invariably throw them out, to be nursed until they will eat their rations. Animals, to be kept in good condition, and fit for proper service, should eat their ten and twelve

quarts of grain per head per day, with hay in proportion—say, twelve pounds.”

A Conundrum.—Although we have borrowed so freely from Mr. Riley's book, two more of his paragraphs cannot be spared: “The mule seems to have been used by the ancients in a great variety of ways; but what should have prompted his production must forever remain a mystery. That they early discovered his great usefulness in making long journeys, climbing mountains, and crossing deserts of burning sand, when subsistence and water were scarce; and horses would have perished, is well established. That he would soon recover from the severe effects of these long and trying journeys must also have been of great value in their eyes. But however much they valued him for his usefulness, they seem not to have had the slightest veneration for him, as they had for some other animals. I am led to believe, then, that it was his great usefulness in crossing the sandy deserts that led to his production. It is a proof, also, that where the ass was at hand there was also the horse, or the mule could not have been produced. Any people with sufficient knowledge to produce the mule would also have had sufficient knowledge to discover the difference between him and the horse, and would have given the preference to the horse in all service except that I have just described. And yet, in the early history of the world, we find men of rank, and even rulers, using them on state and similar occasions; and this when it might have been supposed that the horse, being the nobler animal, would have made more display.

Why was it?—“The Scriptures tell us that Absalom, when he led the rebel hosts against his father David, rode on a mule, that he rode under an oak, and hung himself by the hair of his head. Then, again, we hear of the mule at the inauguration of King Solomon. It is but reasonable to suppose that the horse would have been used on that great occasion, had he been present. On the other hand, it is not reasonable to suppose that the ass, or anything pertaining to him, was held in high esteem by a nation that believed they were commanded by God, through their prophet Moses, not to work the ox and the ass together. It must be inferred from this that the ass was not held in very high esteem, and that the prohibition was for the purpose of not degrading the ox, he being of that family of which the perfect males were used for sacrifice. The ass, of course, was never allowed to appear on the sacred altar. And yet He who came to save our fallen race, and open the gates of heaven, and fulfill the words of the prophet, rode a female of this apparently degraded race of animals when he made his triumphal march into the city of the temple of the living God.”

On the opposite page is a table showing the mule industry the last three decades.

Horses.—The number of horses has risen from 4,336,719 in 1850 to 10,357,488 in 1880; a gain of 6,020,769, or more than 143 per cent, in the thirty years. In 1850 Ohio headed the list with 463,397; in 1860, Ohio again, with 625,346; in 1870 Illinois had gone to the front with 853,738; and at the front she remained in 1880 with 1,023,082. It is a curious commentary on the old fear that railways would destroy the market for horses, that their number has most increased where railways have been most developed.

In five of the old slave States, the equine population diminished in the thirty years. Alabama fell from 128,001 in 1850 to 113,950 in 1880, a loss of 14,051; Georgia fell from 151,331 to 98,520, a loss of 52,811; Mississippi fell from 115,460 to 112,309, a loss of 3151; North Carolina fell from 148,693 to 133,686, a loss of 5007; South Carolina fell from 97,171 to 60,660, a loss of 36,511; and Tennessee fell from 270,636 to 266,119, a loss of 4517. But in each of these States the gain in mules and asses more than makes up the loss in horses. In these six States there were returned in 1850, horses 911,292, mules and asses 309,866, together 1,221,158; and in 1880, horses 789,244, mules and asses 705,311, together 1,490,555; a net gain in the two classes taken together of 269,397.

In 1850 there were returned, horses 4,336,719, mules and asses 559,331, together 4,896,050, to a population of 23,191,876, or an animal of equine parentage to each $4\frac{1}{2}$ inhabitants. In 1880, horses 10,357,488, mules and asses 1,812,808, together 12,170,296, to a population of 50,155,783, or an animal to each $4\frac{1}{3}$ inhabitants, notwithstanding that the miles of railroad had increased in the thirty years from 9021 in 1850 to 93,671 in 1880.

It would be interesting and instructive to learn the average value of each animal in 1850 and in 1880. Undoubtedly the common horse of to-day is a great deal better animal, and will sell for much more money, than his predecessor a human generation ago. Probably that increase is one third to one half. The deep and widespread interest in running and trotting for their own sakes, as well as the efforts purposely made to improve horse stock, have borne large and gratifying fruit.

Mules and Asses.—The number of these animals, taken by themselves, has risen from 559,331 in 1850 to 1,812,808 in 1880, a gain of 1,253,477, or about 224 per cent, in the thirty years. In 1850 Tennessee headed the list with 75,303; in 1860, Tennessee again, with 126,345; in 1870, Missouri, with 111,502; and in 1880 Missouri still led with 192,027. Of the States each possessing more than 100,000 mules and their fathers in 1880,

TABLE

Showing the number of Horses, and of Mules and Asses, in the United States and Territories, according to the Seventh, Eighth, Ninth and Tenth Census: with the area in square miles, and the total population of each State and Territory, according to the Tenth Census.

STATES AND TERRITORIES.	1880.				1870.		1860.		1850.	
	Area in Sq. Miles.	Population.	Horses.	Mules and Asses.	Horses.	Mules and Asses.	Horses.	Mules and Asses.	Horses.	Mules and Asses.
Alabama	51,540	1,262,505	113,950	121,081	80,770	76,675	127,063	111,687	128,001	59,895
Arizona	112,920	40,440	6,798	891	335	401				
Arkansas	53,045	802,525	146,333	87,082	92,013	36,202	140,198	57,358	60,197	11,559
California	155,980	804,694	237,710	28,343	192,273	17,533	160,610	3,681	21,719	1,666
Colorado	103,645	194,327	42,257	2,581	6,446	1,173				
Connecticut	4,845	622,700	44,940	539	34,935	190	33,276	82	26,879	49
Dakota	147,700	135,117	41,670	2,703	2,514	225	84	19		
Delaware	1,960	146,608	21,933	3,931	16,770	3,584	16,562	2,294	13,852	791
District of Columbia	61	177,624	1,027	68	533	124		122	824	57
Florida	54,240	269,493	22,636	9,606	11,902	8,835	13,446	10,910	10,848	5,002
Georgia	58,980	1,542,180	98,529	132,078	81,777	87,426	130,771	101,069	151,331	57,379
Idaho	84,290	32,610	24,300	610	2,151	371				
Illinois	56,000	3,077,871	1,023,082	123,278	853,733	85,075	563,736	38,539	257,657	10,573
Indiana	35,910	1,978,301	581,444	51,780	497,883	43,259	520,677	28,893	314,299	6,599
Iowa	55,475	1,624,615	792,322	44,424	433,642	25,485	175,088	5,734	38,536	754
Kansas	81,700	906,096	430,907	64,869	117,786	11,786	20,344	1,496		
Kentucky	40,000	1,648,690	372,648	116,153	317,034	99,230	355,704	117,634	315,682	65,609
Louisiana	45,420	939,946	104,428	76,674	59,738	61,338	78,303	91,762	89,514	44,849
Maine	29,895	648,936	87,848	298	71,514	336	60,537	104	41,721	55
Maryland	9,860	934,943	117,796	12,561	89,696	9,830	93,406	9,829	75,684	5,644
Massachusetts	8,040	1,783,085	59,629	243	41,039	103	47,786	108	42,210	34
Michigan	57,430	1,636,937	378,778	5,083	228,302	2,353	136,917	330	88,506	70
Minnesota	79,205	789,773	257,282	9,019	93,011	2,350	17,065	377	860	14
Mississippi	46,340	1,131,597	112,309	129,778	90,221	85,886	117,571	110,723	115,460	54,547
Missouri	68,735	2,168,380	667,776	192,027	493,969	111,502	361,874	80,941	225,319	41,667
Montana	145,310	39,159	35,114	858	5,289	475				
Nebraska	76,185	452,402	204,864	19,999	30,511	2,632	4,449	469		
Nevada	109,740	62,266	32,087	1,258	7,520	990	541	134		
New Hampshire	9,005	346,991	46,773	87	39,095	37	41,101	10	34,233	19
New Jersey	7,455	1,131,116	86,940	9,267	379,708	8,853	79,707	6,362	63,955	4,089
New Mexico	122,460	119,565	14,547	9,063	5,033	6,141	10,066	11,291	5,079	8,654
New York	47,620	5,082,071	610,358	5,072	536,861	4,407	503,725	1,553	447,014	963
North Carolina	48,580	1,399,750	133,686	81,871	102,763	50,684	150,661	51,388	148,693	25,259
Ohio	40,760	3,198,662	736,478	19,481	609,722	16,065	625,346	7,194	463,307	3,423
Oregon	94,560	174,768	124,007	2,804	51,702	2,581	36,772	980	8,046	420
Pennsylvania	44,685	4,282,891	533,587	22,914	460,339	18,009	437,654	8,832	359,398	2,259
Rhode Island	1,085	276,531	9,661	46	7,770	43	7,121	10	6,168	1
South Carolina	30,170	995,577	60,660	67,005	44,105	41,327	81,125	56,456	97,171	37,483
Tennessee	41,750	1,542,359	266,119	173,498	247,254	102,983	290,882	126,345	270,636	75,393
Texas	262,290	1,591,749	805,600	132,447	424,504	61,322	325,698	63,334	76,760	12,403
Utah	82,190	143,993	38,131	2,898	11,008	2,879	4,505	851	2,429	375
Vermont	9,135	332,286	75,215	283	65,015	252	69,071	43	61,057	218
Virginia	46,125	1,512,505	218,838	33,598	152,899	26,903	287,579	41,015	272,403	21,483
Washington	66,880	75,116	45,848	626	11,138	943	4,772	159		
West Virginia	24,045	618,457	120,143	6,226	90,479	2,139				
Wisconsin	54,450	1,315,497	352,428	7,136	252,019	4,195	116,180	1,030	30,179	156
Wyoming	97,575	20,789	11,975	671	584	282				
States and Territories	2,900,170	30,125,773	10,357,488	1,812,808	7,145,370	1,125,415	6,249,174	1,151,148	4,336,719	559,331

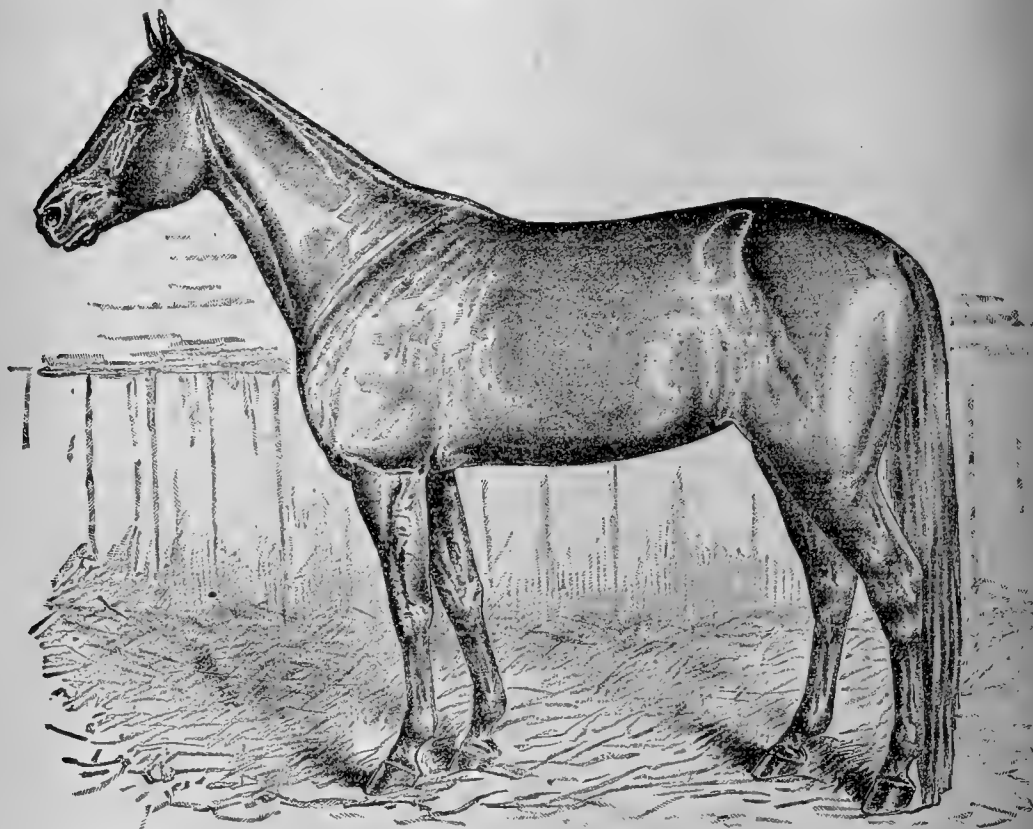
Alabama had, 121,081; Georgia, 132,078; Illinois, 123,278; Kentucky, 116,153; Mississippi, 129,778; Missouri, as above, 192,027; Tennessee, 173,498; and Texas, 132,447. These eight States own 1,120,340, or nearly two thirds of the whole. So that the percentage of increase has been greater

among mules and asses than among their prouder and more aristocratic brethren, the "straight" horses.

Looking at Rhode Island in the year 1850, one is irresistibly tempted to ask, What was his name?

TROTTING IN THE UNITED STATES.

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MAUD S. RECORD, AUGUST 11, 1881, 2.10¼.

Horse-Racing.—This has been practiced from very early times. In the Iliad the various incidents of the chariot race at the funeral games held in honor of Patroclus are detailed with great vividness. And in all history, races are referred to. In England they have attained the character of national institutions; and the St. Leger, Derby and Oaks, Ascot, Goodwood, Epsom and Newmarket, are practically recognized as integral parts of the British constitution, and in their honor Parliament adjourns, to allow its honorable members opportunity to attend, as systematically as our Congress adjourns over the Christmas holidays. But the word Racing still keeps up its original meaning, the speeding of horses in the way of running; and, in America, other words have to be employed when the contest is one of any other motion.

American Trotting.—We borrow freely from an article in the *Encyclopædia Britannica*, written by W. T. Chester, Esq., of New York. The development of speed in the trotting horse through systematic breeding and training is one of the great industries of North America, and in no other portion of the world, except in Russia, is it pursued to any great extent. This interest, which has attained vast proportions, is entirely the growth of a century, dating back to the importation to Philadelphia from England, in 1788, of the thorough-bred horse Messenger. This was a gray stallion, by Mambrino, 1st dam by Turf, 2d dam by Regulus, 3d dam by Starling, 4th dam by Fox, 5th dam Gipsy, by Bay Bolton, 6th dam by Duke of Newcastle's Turk, 7th dam by Byerly Turk, 8th dam by Taffolet Barb, 9th dam by Peace's White Turk. He was eight years old

when imported into the United States. He was at the stud for twenty years, in the vicinity of Philadelphia and New York, serving a number of thorough-bred mares, but a far greater number of cold-blooded mares, and in the progeny of the latter the trotting instinct was almost invariably developed, while his thorough-bred sons, who became scattered over the country, were also noted for transmitting the trotting instinct. That Messenger was the fountain-head of American trotting is shown by the fact that almost every trotter of merit, whose pedigree is reasonably well established, traces to him in one or more lines, and the more Messenger strains there are in a pedigree the greater is esteemed its value. It was years after the death of Messenger, however, before these facts became apparent; the taste of the country went to running contests.

Beginning of Trotting.—The first public trotting race in the United States of which there is any account was in 1818, when the gray gelding Boston Blue was matched to trot a mile in 3 minutes, a feat deemed impossible, but he won, though the time of his performance has not been preserved. From about that date interest in this gait began to increase; breeders of trotters in a small way sprang up, and horses were trained for trotting contests. The problem of breeding trotters has been necessarily found to be a much more complex one than that of breeding the thorough-bred, as in the latter case pure blood lines of long-recognized value could be relied on, while in the former, the best results were constantly being obtained from most unexpected sources.

Great Trotting Families.—At the present day, the leading families are the Hambletonian, of which the modern head was Rysdyk's Hambletonian, a bay horse foaled in 1849, got by Abdallah (traced to imported Messenger on the side of both sire and dam) out of the Charles Kent mare by imp. Bellfounder, with two crosses to imp. Messenger on her dam's side; the Mambrinos, whose modern head was Mambrino Chief, foaled 1844, by Mambrino Paymaster, a grandson of imp. Messenger; the Bashaws, founded by Young Bashaw, foaled 1822, by Grand Bashaw, an Arabian horse, dam Pearl, by First Consul; the Clays, springing from Henry Clay, a grandson of Young Bashaw through Andrew Jackson, and properly a branch of the Bashaw family, but arbitrary usage, of which there is much in American trotting lineage, makes them distinct; the Stars, springing from Stockholm's American Star, by Duroc, son of imp. Diomed; the Morgans, whose founder was Justin Morgan, foaled 1793, by a horse called True Briton, or Beautiful Bay, who was probably thorough-bred; the Black Hawks, a branch of the Morgan family;

the Blue Bulls, descended from Doyle's Blue Bull, foaled 1855, a pacer, sired by a pacer of the same name, dam by Blacknose, son of Medoc; the Canadians, whose best representatives were St. Lawrence and Pacing Pilot, horses of unknown pedigree; the Golddusts, another branch of the Morgan family; and the Royal Georges, springing from Tippoo, a horse who was probably by Ogden's Messenger, son of imp. Messenger. There are many subordinate branches of these leading families not named here, and in some cases trotters of great speed have been produced which do not trace to any of the sources mentioned.

Breeding Trotters.—The breeder has an extensive field before him, and the questions of in-breeding, or out-crossing, or the value of thorough-bred crosses, pacing crosses, etc., have to be considered, and are abundantly discussed. There are many large and successful establishments for breeding trotters. All of them are extensive in acreage, while on several a hundred or more brood-mares are kept, besides a number of stallions. As a rule, the stallions do service outside the farms where they are owned, but in some cases they are reserved strictly for home use. Very large prices are frequently paid for youngsters, solely on the strength of their breeding. In 1876 \$13,000 was paid for two two-year-old fillies, and \$41,200 for a lot of thirteen, nearly all young. Steinway, a three-year-old colt, was sold in 1879 to go to California, for \$12,000; and in 1878 \$21,000 was paid for the four-year-old filly, Maud S., after she had trotted a mile in public in 2.17½, —a speed which she reduced in 1881 to 2.10½. Much larger sums have been paid, however, for matured trotters, such as \$40,000 for the stallion Smuggler, \$38,000 for Pocahontas, \$35,000 for Dexter, \$36,000 for Rarus, and long prices for many others; St. Julien, the trotter with the fastest record at the close of 1879, was held at \$50,000, while Rysdyk's Hambletonian, Messenger, Duroc, and Volunteer were valued, in their prime, at \$100,000 each.

Track Requirements.—Since the early days of American trotting, the advance has been rapid and the changes marked. After the performance of Boston Blue, mentioned above, more attention was paid to the gait, but for a long time the races were generally under saddle, and at long distances, 3 miles being rather the favorite. The best of the old-timetrotters were Edwin Forrest, who trotted a mile in 2.31½ in 1834; Dutchman, whose 3 miles under saddle in 7.32½ is still the best on record; Ripton; Lady Suffolk, who trotted a mile in 2.26½ in 1843, and headed the list of performers; Mac, Tacony, etc. Since 1850, however, the public taste has settled upon the style of race called "mile heats, best three out of five.

in harness," as the favorite, and nine out of ten contests are of this character. By "in harness" is meant that the horse draws a sulky, a light two-wheeled vehicle, in which the driver sits close to the horse, with his legs on each side of the animal's flanks. These sulkies often weigh less than forty pounds. The driver is required to weigh, with the blanket on which he sits, 150 pounds, while for saddle-races the regulation weight is 145 pounds. Each heat of a mile is a separate race; 20 minutes are allowed between heats; and the horse that first places three heats to his credit wins the race. There are various penalties imposed upon a horse that breaks into a run in a trotting race. The driver is required to pull him to a trot as quickly as possible; if the horse gains by running, the judges set him back at the finish twice the distance he has gained, in their estimation, by running; and for repeated "breaks" they can declare him distanced.

"Records."—The first-class tracks are of an oval shape, with long stretches and easy curves, measuring 1 mile at 3 feet distance from "the pole," as the inner railing of the track is called. The time in which the leading horse trots each heat is accurately kept, placed on a blackboard in front of the judges' stand for the information of the public, and also placed in the book of the course. The fastest time that any trotter has made is thus entered as his "record." This is one of the distinctive features of trotting in America. The purses given by the associations owning tracks are generally divided into classes, such as for horses that have never beaten 3 minutes, 2.40, 2.20, etc. Hence it is an object, as a rule, for the record of a trotter to be kept as slow as possible, that he may be eligible to compete in slow classes; and as the purses are divided into three or four moneys, and the second money is usually half as large as the first, drivers frequently "pull" a superior animal, and content themselves with an inferior portion of the purse for the sake of avoiding a record, which attaches only to the winner of a heat: and from this cause springs a great deal of dishonest driving. It is in the power of the judges, when they think that a horse is not being driven to win, to substitute another driver; and this is often done.

Size of Purses.—Prior to 1866 purses for trotters were small; match-races were more in vogue, and the trotting turf was in bad odor. In that year an association was formed at Buffalo, N. Y., which undertook to remedy the evil, and inaugurated its efforts by offering the then unprecedented sum of \$10,500 for a trotting meeting of four days' duration. The experiment was successful; other cities followed the example of Buffalo; larger and larger purses were given; and at Buffalo in 1872 the prizes amounted to \$70,000.

Twice at this track \$20,000 has been given for a single race. Other cities are also in the habit of giving large purses, and the amount offered in the United States and Canada, during a single year, has reached nearly \$1,500,000. Individual trotters, in the course of a long turf career, earn enormous amounts. The most remarkable instance of this was the mare Goldsmith Maid, by Alexander's Abdallah (a son of Rysdyk's Hambletonian), out of an Abdallah mare. She began trotting in 1866, and left the turf in 1878, when 21 years old, and her winnings amounted to over \$200,000.

National Trotting Association.—This organization was formed in 1869, and embraces in its membership all the principal tracks of the continent. All members of this association respect the penalties imposed by any other member, and exclusion from the privileges of one is exclusion from the privileges of all. This has had a great tendency to reform abuses in the trotting turf, enabling severe penalties to be inflicted for infractions of the rules, a very elaborate code of which has been published by the National Trotting Association, which is revised triennially.

King or Queen of the Turf.—In trotting races the time test is supreme. The animal which has the fastest record for one mile in harness is, until deposed, king or queen of the trotting turf. Lady Suffolk, with her record of 2.26½ in 1843, held this honor till 1853, when Tacony trotted in 2.25½ under saddle; Flora Temple wrested it from him in 1856 by trotting in 2.24½ in harness. This latter mare, in 1859, trotted a mile in 2.19¾, a feat which the best horsemen thought would never be repeated. Dexter's record was 2.17½ in 1867, and Goldsmith Maid's, in 1871, was 2.17, which she reduced, by successive efforts, to 2.16½, 2.16, 2.15, 2.14½, and finally, in 1874, to 2.14. In 1878 Rarus trotted a mile in 2.13½, and in October 1879 the bay gelding St. Julien, by Volunteer, son of Rysdyk's Hambletonian, dam by Henry Clay, trotted a mile in California in 2.12½, which he reduced at Hartford in 1880 to 2.11½. He had to surrender the lead in 1881 to the chestnut mare *Maud S.*, by Harold, son of Rysdyk's Hambletonian, dam Miss Russell by Pilot, Jr., who in 1881 trotted in 2.10½. This mare has been already mentioned, as having been bought in 1878, when four years old, for \$21,000. She remains queen, with one rival near the throne; but is regarded as quite able largely to reduce her own record. Not only has she trotted the fastest single mile, but she has trotted the three fastest consecutive heats: at Belmont Park, Philadelphia, in 2.12, 2.13½, 2.12½. Rarus trotted three heats at Hartford in 1878 in 2.13½, 2.13½, and 2.15. There is a great diversity of opinion among the best informed horsemen as to the

limit of trotting speed, but none fix it slower than 2.10, while the more sanguine believe that a mile will yet be made by a trotter in two minutes.

Season of 1883.—The one rival to Maud S., just alluded to, is the black gelding Jay-Eye-See, by Dictator (again the Rysdyk Hambletonian strain), dam Midnight. This curious and utterly prosaic name is taken from the initials of the horse's owner, J. I. Case, Esq. In Chouler's Turf Register of 2.30 horses, made up to June 1882, this name is conspicuous by its absence; but at the end of 1882, Jay-Eye-See had a record of 2.19. This record he reduced in 1883, at Providence, R. I., Sept. 15, to 2.10 $\frac{1}{2}$, thus stepping in midway between Maud S.'s 2.10 $\frac{1}{2}$ and St. Julien's 2.11 $\frac{1}{2}$. Later in the season, at the old Fleetwood Park, Jay-Eye-See beat St. Julien in three straight heats; but the track was heavy, St. Julien not up to himself, and the time at Providence was not equaled. When Maud S. and Jay-Eye-See are matched in a trot, both in their best "form," with a good day and track, another slice will probably be pared from the present best record of 2.10 $\frac{1}{2}$. By that time some other Hambletonian colt, now as unknown as was Jay-Eye-See in June 1882, may be shouldering between the two present competitors, or may surpass them both. Jay-Eye-See is so perfectly balanced in his action as not to need to be heavily shod. He wears eight-ounce shoes forward and four-ounce shoes behind. He eats in utter contempt of some doctor's saws, with a pailful of water near him, into which he dips his nose with each mouthful of oats, and moistens his hay in the same manner.

Converting Pacers.—The pacing gait, in which the front and hind legs on the same side are moved in the same direction simultaneously, is admitted to be faster than the trotting, in which the near fore leg and off hind leg move together; but as pacing is not fashionable, and small purses are given for contests between pacers, a great deal of skill has been expended, of late years, in converting pacers to trotters. This is done by means of toe-weights on the forward feet, which are knobs of brass or iron screwed into the hoof or fastened to the shoe, by means of which a competent trainer can not only change a pacing into a trotting horse, but can correct any errors of gait in a natural trotter. With inveterate pacers very heavy weights have to be used, but these can gradually be lessened as the horse becomes accustomed to the trot. So effective are these weights found that there are very few fast trotters upon whom they are not used to some extent, unless the same object is effected, by wearing a very heavy forward shoe. In the season of 1883, a pacing horse, Johnston, covered

a mile in 2.10. But—it was with a running mate. Putting a running mate by the side of a trotter or a pacer in harness is very much like supplementing a horse with a locomotive. In either case, if the horse can only move his feet fast enough, the auxiliary will carry him along, doing the work. Nevertheless, it was something that Johnston could swing his feet and sides in that time, even if the running mate did haul him along.

Market for Trotters.—The market for American trotters is by no means confined to those intending to use them for track purposes. While there are probably ten thousand in training, at least an equal number are used by gentlemen for road purposes; and there is great rivalry among wealthy men with a taste for driving, to secure the best stable, and especially the fastest double team. In September 1877, Mr. W. H. Vanderbilt drove his team, composed of Small Hopes and Lady Mac, a full mile over Fleetwood Park track, near New York City, in 2.23, which is 3 $\frac{1}{2}$ seconds faster than the best record for a mile by a double team, the 2.23 performance not being a technical record.

Rysdyk's Hambletonian.—This horse has had a greater influence on the breed of trotting horses than any other since Messenger, from whom he was descended by both parents. He, his sons, grandsons and great-grandsons are the progenitors of more than three hundred of the horses who have made 2.30 or better. In this list are Maud S., Jay-Eye-See, St. Julien, Clingstone, Goldsmith Maid, Dexter, Trinket, Hattie Woodward, Judge Fullerton, So-So, Santa Claus, Gloster, Great Eastern, Piedmont, Darby, Rob. McGregor, Edwin Thorne, etc. etc. It would be interesting to compare the average value of all the colts he served with the five hundred dollars each charged for his services. Like the Patent Office business, while there are undoubtedly many and great prizes, there are also a multitude of blanks. Even among men, a great sire does not always produce a great son, and the sire is only one factor in the offspring. The Mambrinos follow the Hambletonians, a "bad second."

On the following page we have grouped the horses under their best record. Daniel Webster is reported to have told a young lawyer who complained that the legal profession was crowded, that there was plenty of room higher up. So with the trotters. How fast the competitors thin out, as the time lessens! And what a change from Hiram Woodruff's time, when "2.40 on the plank" meant a first-class trot, to the present, when the usual lists of trotters ignore all horses slower than 2.10!

LIST OF THE CHAMPION TROTTERS.

Giving Reduction of the Records from 1845 to the Close of 1901, etc.

NOTE.—The asterisk (*) denotes a record made against time; the double dagger (‡) denotes a half-mile track.

CHAMPION TROTTERS.

SHOWING THE REDUCTION OF THE TROTTING RECORD
FROM 2.30 TO 2.02½.

<p>Lady Suffolk, gr. m., foaled 1833, by Engineer 2d, 3; dam by Don Quixote. Driven by David Bryan, Beacon Course, Hoboken, N. J., Oct. 13, 1845</p>	2.29½
<p>Pelham (converted pacer), b. g. foaled 1837, pedigree not traced. Driven by William Whelen, Centreville, N. Y., July 2, 1849</p>	2.28
<p>Highland Maid (converted pacer), b. m. foaled 1847, by Saltram; dam Roxana, by Hickory. Driven by F. J. Nodine, Centreville, N. Y., June 15, 1853</p>	2.27
<p>Flora Temple, b. m. foaled 1845, by Bogus Hunter; dam Madam Temple, by Terry Horse. Driven by Hiram Woodruff, Union Course, East New York, N. Y., Sept. 2, 1856</p>	2.24½
<p>Flora Temple. Driven by James D. McMann, Centreville, N. Y., Aug. 9, 1859</p>	2.23½
<p>Flora Temple. Driven by James D. McMann, Centreville, N. Y., Aug. 9, 1859</p>	2.22
<p>*Flora Temple. Driven by James D. McMann, Cincinnati, Ohio, Oct. 7, 1859</p>	2.21½
<p>Flora Temple. Driven by James D. McMann, Kalamazoo, Mich., Oct. 15, 1859</p>	2.19½
<p>‡Dexter, br. g. foaled 1858, by Hambletonian, 10; dam Clara, by American Star, 14. Driven by Budd Doble, Riverside Park, Boston, Mass., July 30, 1867</p>	2.19
<p>*Dexter. Driven by Budd Doble, Buffalo, N. Y., Aug. 14, 1867</p>	2.17½
<p>Goldsmith Maid, b. m. foaled 1857, by Abdallah, 15; dam Ab., by Abdallah, 1. Driven by Budd Doble, Milwaukee, Wis., Sept. 6, 1871,</p>	2.17
<p>*Goldsmith Maid. Driven by William H. Doble, Mystic Park, Boston, Mass., June 9, 1872</p>	2.16½
<p>*Occident, br. g. foaled 1863, by Doc. 449; dam Mater Occidentis, pedigree not traced. Driven by George Tennent, Sacramento, Cal., Sept. 17, 1873</p>	2.16½
<p>Goldsmith Maid. Driven by Budd Doble, East Saginaw, Mich., July 16, 1874</p>	2.16
<p>*Goldsmith Maid. Driven by Budd Doble, Buffalo, N. Y., Aug. 7, 1874</p>	2.15½
<p>Goldsmith Maid. Driven by Budd Doble, Rochester, N. Y., Aug. 12, 1874</p>	2.14½
<p>*Goldsmith Maid. Driven by Budd Doble, Mystic Park, Boston, Mass., Sept. 2, 1874</p>	2.14
<p>*Rarus; b. g. foaled 1867, by Abdallah (Conklin's); dam Nancy Awful, by Telegraph. Driven by John Splan, Buffalo, N. Y., Aug. 3, 1878</p>	2.13½
<p>*St. Julien; b. g. foaled 1869, by Volunteer, 55; dam Flora, by Harry Clay, 45. Driven by Orrin Hickok, Oakland, Cal., Oct. 25, 1879</p>	2.12½
<p>*Maud S., ch. m. foaled 1874, by Harold, 413; dam Miss Russell, by Pilot Jr., 12. Driven by W. W. Bair, Rochester, N. Y., Aug. 12, 1880</p>	2.11½
<p>*St. Julien. Driven by Orrin Hickok, Rochester, N. Y., Aug. 12, 1880</p>	2.11½
<p>*St. Julien. Driven by Orrin Hickok, Hartford, Conn., Aug. 27, 1880</p>	2.11½
<p>*Maud S. Driven by W. W. Bair, Chicago Driving Park, Chicago, Ill., Sept. 18, 1880</p>	2.10½
<p>*Maud S. Driven by W. W. Bair, Homewood Park, Pittsburg, Pa., July 13, 1881</p>	2.10½
<p>*Maud S. Driven by W. W. Bair, Rochester, N. Y., Aug. 11, 1881</p>	2.10½
<p>*Jay-Eye-See, bl. g. foaled 1878, by Dictator, 113; dam Midnight, by Pilot Jr., 12. Driven by Edwin Bither, Providence, R. I., Aug. 1, 1884</p>	2.10
<p>*Maud S. Driven by W. W. Bair, Cleveland, Ohio, Aug. 2, 1884</p>	2.09½
<p>*Maud S. Driven by W. W. Bair, Lexington, Ky., Nov. 11, 1884</p>	2.09½
<p>*Maud S. Driven by W. W. Bair, Cleveland, Ohio, July 30, 1885</p>	2.08½
<p>*Sunol, b. m. foaled 1886, by Electioneer, 125; dam Waxana, by Gen. Benton, 1755. Driven by Charles Marvin, Stockton, Cal., Oct. 20, 1891</p>	2.08½
<p>*Nancy Hanks, br. m. foaled 1886, by Happy Medium, 400; dam Nancy Lee, by Dictator, 113. Driven by Budd Doble, Chicago, Ill., Aug. 17, 1892</p>	2.07½
<p>*Nancy Hanks. Driven by Budd Doble, Independence, Ia., Aug. 31, 1892</p>	2.05½
<p>*Nancy Hanks. Driven by Budd Doble, Terre Haute, Ind., Sept. 28, 1892</p>	2.04
<p>*Cresceus, world's record, Columbus, Ohio, Aug. 2, 1901</p>	2.02½

CATTLE.

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Guernsey. — The Guernsey breed of cattle takes its name from the little Island of Guernsey, one of the Channel islands. The origin of the cattle of these Channel islands, among which are the Island itself, which is cut off from the main land by a little strip of sea, and protected by the rock-bound coast. The one aim of the inhabitants was to produce a cow excelling all others in butter production.



MR. PEARSONS' IMPORTED GUERNSEY BULL.

Alderneys, Guernsey, Jersey, and Sarc, is greatly disputed, but the stock is thought to have come originally from Normandy and Brittany, and that this breed was laid by crossing the Normandy bull upon the Brittany cow. It is noticeable that the Guernsey cattle partake of the characteristics of the The Guernsey is the result, producing butter of the finest natural color with the least outlay for feed. Up to recent date the Guernseys in America were kept for family use, but in 1840 they were introduced into private dairies around Philadelphia, and since then have kept their place ahead of all others.

A little later the Massachusetts Society for the Promotion of Agriculture, foreseeing the future of this breed, imported some, and distributed them in a public sale to different dairy men in the State. Later on, they were adopted by Connecticut farmers; so on Feb. 7, 1877, the American Guernsey Cattle Club was organized in New York State. There were only about 150 pure bred Guernseys in the country at that time whose pedigrees could be traced to the Island. To-day there are about 14,000 animals registered.

The Guernsey differs from the Jersey in many respects. They have not the deer-like appearance of the Jersey; they are coarser in bone, heavier in carcass, and being larger every way, are less precocious. They are first allowed to calve at about two and a half years old, which gives them more size. It is a well-known fact that the size of the calves, and the aptitude of the cattle to make beef and turn off well when their usefulness in the dairy is from any cause at an end, are matters of no small importance to the so-called "common farmers;" that is, those who are obliged to study closely the economy of farming. So

ties of full bloods to a remarkable degree. Every point of the Guernsey is rich in itself—the horn



A DRIVE.



SCENES ON THE ISLAND OF GUERNSEY.

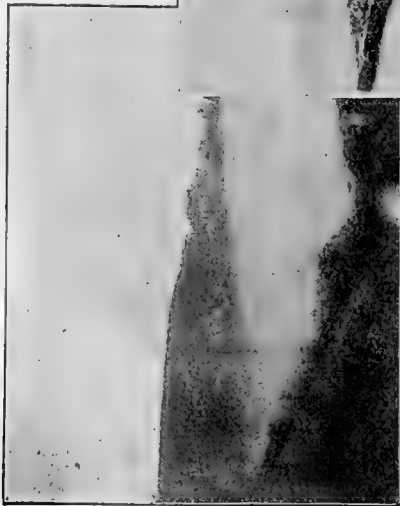
is soft and full, the hoofs are most frequently like tortoise-shell, the skin is soft and yellowish in tint. The prevailing color of the animal itself is a delicate shade of fawn with white markings, and a cream-colored nose. The greatest characteristic is the golden color around the eye, on the bag, at the base of the horns, and at the end of the tail bone. The disposition of these cattle is remarkably affectionate and quiet, and the cow is pre-eminently the one for dairy use. The rich golden color

of the cream and butter cannot be excelled. The animal has the ability of fattening rapidly when dried off. The cows are of good size and hardy. The cream is very thick and yellow; the milk is rich and yields a very large percentage of cream.

The Guernsey cow gives as fine golden butter as the Jersey, and a large quantity of it. The celebrated cow, Bretonne, gave 539 pounds of butter, and nearly 100 cows have been reported to have made a record of 14 pounds of butter or over a week.

These animals have a strong constitution and well-developed udders. The bulls most commonly used in the Island of Guernsey are one and two years old. The animals are very docile and pay no attention to visitors. The influence which pure bred bulls exert is readily acknowledged. They inten-

strong are the characteristics of the race that grades or even half breeds possess the best quali-



THE HARBOR.

sify the good qualities of the breed, and produce animals of great physical strength and size without sacrificing the richness of the milk production.

The Guernsey Grade Cow.—This cow has

“ My own experience thus far in the use of grade Guernsey cows sired by Guernsey bulls or high-grade Short-Horn cattle is altogether satisfactory. My first grade Guernsey heifers, eight or ten in number, were calved in 1882,



AYRSHIRE COW.

been found to be a great success, as the best characteristics of the race are preserved, and as each year American dairymen are demanding more and more a strictly dairy cow, and a dairy

and continuously on in every succeeding year until now. So I have at the present time several three-fourths bred already in milk. Altogether of Short-Horn grade, Guernsey grades,



POLLED ANGUS COW.

bred one as well. This six years' experience is quoted from Hon. Lewis F. Allen, of Buffalo, N. Y. He commenced the use of the registered Guernsey bull upon his registered high-grade Short-Horn cows in the year 1880.

younger heifers, and heifers' calves, they number a herd of fully 100, of which about seventy are from Guernsey sires, thoroughbred bulls. Fifty regular milch cows are now used in my butter dairy, the older grade Short-Horn cows, which are



MR. PEARSON'S GUERNSEY CATTLE.

continuously drawn out for sale or beef as the young Guernsey heifers bring forth their calves to take their places, being not quite thirty in number. The Guernsey heifers usually bring their first calves at from 20 to 26 months old; and of all those, there have been but two or three accidental failures to prove first-class milkers, giving, within a month or two after dropping their first calves 24 to 40 pounds of rich milk per day. All of them have large, square udders, sizable teats, and are easy and gentle milkers."

DISEASES OF CATTLE.

General Indications of Disease in Cattle.—The coat of the animal is an indication of the state of health, a "staring-coat" being a symptom of low condi-

tion. is liable to occur almost any month of gestation, particularly from the sixth to the ninth. As a rule, a cow who has once lost a calf will never be a safe breeder; and sometimes it happens that abortion, like a contagious disease, will spread through an entire herd.

Principal Causes of Abortion.—A fright, injury or violent exertion may cause this; therefore, pregnant cows should be treated as gently and quietly as possible. Want of food sometimes causes abortion. Rye, bran and potatoes in large quantities or musty hay and fermented meal, as well as the ergotized grains should never be fed to pregnant animals.

Symptoms of Abortion.—The first symptom is usually a loss of appetite, the animal seeming dull and listless, the milk diminishing in quantity. After a time the cow grows restless, and there will be a



MR. PEARSONS' GUERNSEY CATTLE.

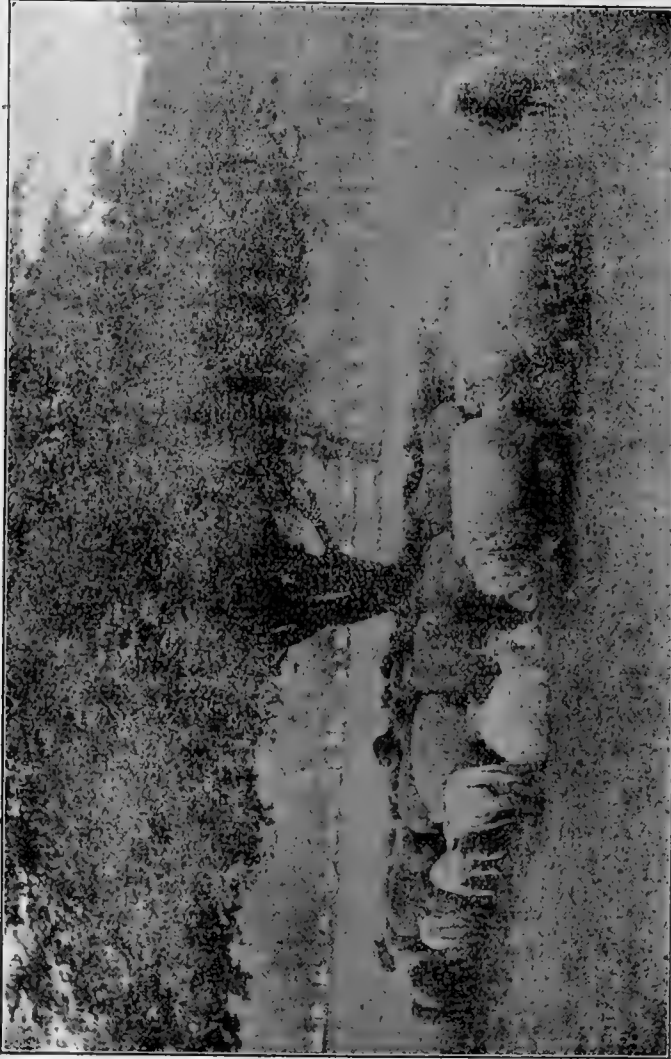
tion. The peculiar positions of standing, lying down, getting up or of moving about are significant. The muzzle of the healthy cow or ox is moist, but in disease becomes either hot or cold, and sometimes changes color. Ventilation and proper sanitation will prevent cattle from having disease, with an abundance of pure water, proper food and frequent change of diet. Many animals are lost through the ignorance of quacks, while judgment and common sense are all that is necessary.

A few of the most common diseases and their preventive will be given.

Abortion.—Abortion, or the dropping of calves, is a source of great loss to farmers and dairy men, and

watery discharge from the vagina, followed a little later by the discharge of the fetus; more or less discharge of a bloody mucus will follow for several days after the loss of the fetus. The after-birth usually becomes decomposed and comes away in fragments, being very offensive in odor.

Treatment.—As soon as the symptoms are discovered the animal should be separated from the rest and put into a comfortable shed. If the fetus has motion it is not dead. If the discharge be fetid it is a sure indication the fetus is dead, and the sooner it is gotten rid of the better. If the water sack inclosing the fetus has not been previously broken this should be done, using the greatest care



A MODEL UPLAND SHEEP PASTURE

This includes good grass and running water with woods sufficient for shade and protection

in order not to puncture the womb, which would cause death to the animal. The after-birth should be removed in the most careful manner, then syringe out the parts with warm water and follow with an injection of carbolic lotion as follows:

One ounce of carbolic acid to the gallon of water, inject into the womb half a pint two or three times a day for a week or ten days.

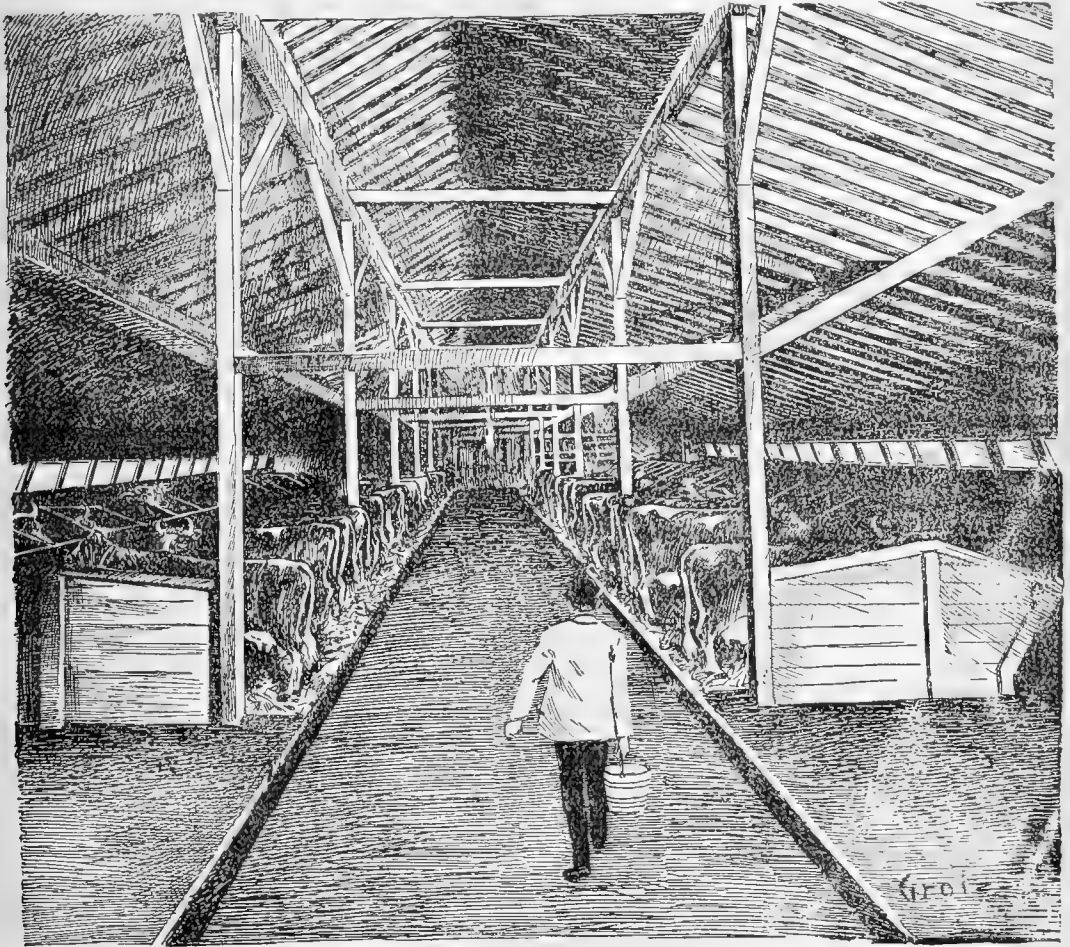
Too much importance cannot be placed upon the necessity of removing all traces of the fetus and placenta or after-birth by burying them at a distance

tance to move, urine of a mucilaginous character and dark in color. Discontinue all green food except grass and ensilage, and give plenty of grain with milk and eggs. Give one dose of the following:

Epsom salts 12 oz., ginger 1 oz., gentian 1 oz., syrup 4 oz., water sufficient to make two quarts. If this does not effect a cure give the following:

Two drams sulphuric acid, $1\frac{1}{4}$ oz. tincture cardamoms, mixed thoroughly with a pint of water.

Anthrax or black leg is a common disease and greatly to be feared being a ligament and contagious.



INTERIOR OF GUERNEY STABLE.

from the places frequented by the herd, and cleansing the stable before it is occupied by other animals.

Albuminuria.—This disease is similar to Bright's disease, and is supposed to be caused by an impoverished condition of the blood or a too long continued sameness of food. The most common symptom is the stretching of the body at full length, and getting the fore and hind feet as far apart as possible. Other symptoms are, constipation, unnatural gait with the hind feet far apart, stiffness and reluc-

It appears externally and internally, and turns the affected parts black. It does not last long and the animal usually sinks in a few hours. Chloride of potassium in one to three dram doses dissolved in water is a good medicine. Whisky or quinine may also be useful, but prevention is better than cure.

Bloody Milk.—It sometimes happens that the blood is mixed with the milk, and in this case the following is a good remedy:



MR. PEARSONS' IMPORTED BULL AND GET, DON OF HAMPTON, AND MEDICINE BULL.

Three drams of camphor, 3 oz. of powdered oak bark, 3 oz. powdered ginger, mix and divide into six doses, giving a dose night and morning in a pint of gruel.

Bronchitis.—This is an inflammation of the mucous membrane of the bronchial tubes. The symptoms are rapid, painful breathing, a severe cough with fever and a rapid pulse. The animal should be kept in a warm, comfortable stable, and fed with warm, soft food. Epsom salts in from eight to ten doses is a good remedy, also put a mustard paste on the lower part of the throat and sides of the chest. Give the animal all the water wished for.

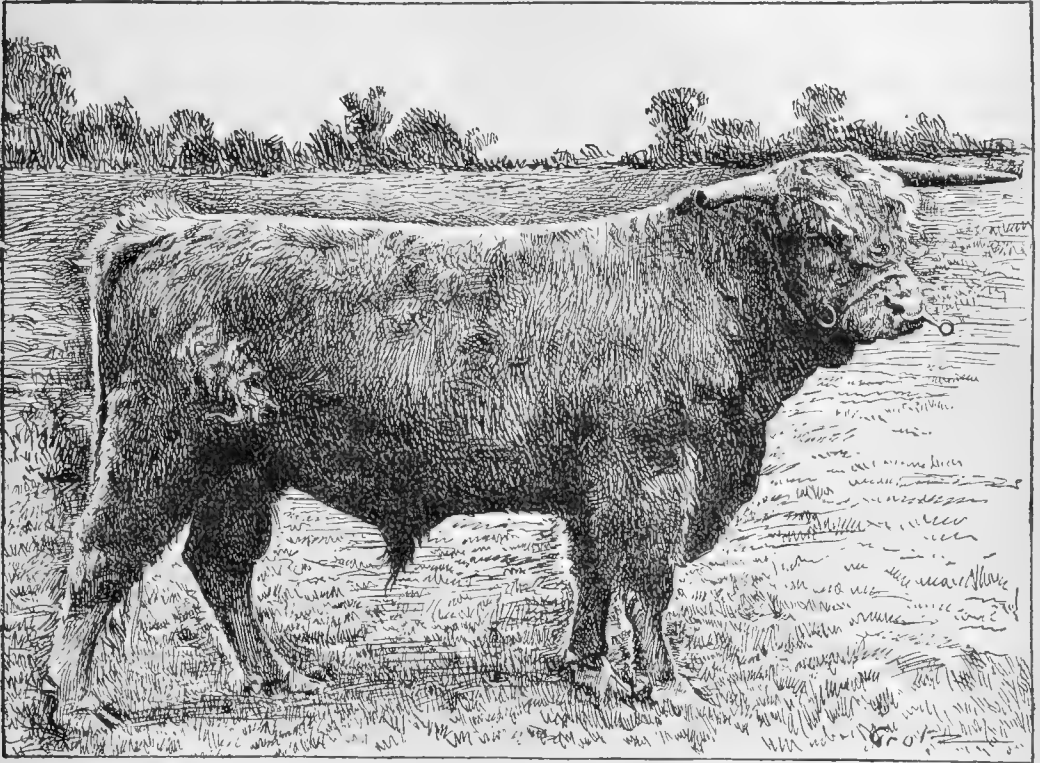
Constipation.—This may be prevented by attend-

Two ounces of castor oil with a tablespoonful of powdered ginger.

Chapped Teats.—Bathe in warm water and wipe dry, then apply fresh, melted lard or sweet cream which has been simmered in oil, also use witch-hazel for bathing.

Colic.—This is caused from constipation, or drinking too much cold water when heated. The symptoms are restlessness and groaning, the animal frequently gets up and down and the body becomes bloated. The following remedy is advisable:

To 1 qt. of warm water add 1 pt. of molasses, 8 oz. of linseed oil, $\frac{1}{2}$ oz. of powdered ginger, mix well and give in one dose. Inject the following:



A FINE SPECIMEN.

ing carefully to the diet of the animal, and allowing a liberal supply of salt so that they will drink freely.

Diarrhea.—This is caused by sudden change of diet, or by improper food. A mild purgative should first be given, then a laxative as follows:

One half a pound of Epsom salts, $\frac{1}{2}$ oz. ginger, 2 dr. of gentian mixed with one pint of gruel. This should be followed in a day or so by an astringent such as this:

Two ounces of prepared chalk, 1 oz. of powdered oak bark, 2 dr. of ginger, 2 dr. of powdered catechu, $\frac{1}{2}$ dr. powdered opium, 1 oz. of peppermint water; mix and give in a quart of warm gruel. In the case of calves begin with a laxative, as:

To 2 qts. of blood-warm water add 6 oz. of olive oil.

Dysentery.—The symptoms are watery, bloody, and offensive discharges from the bowels, with fever, thirst, pain, and loss of appetite. The patient should be kept warm, and not allowed too much to drink, while the following may be given, one half by mouth and the other half by injection:

One-half ounce chloride of lime, $\frac{1}{2}$ oz. tincture of arnica, 1 oz. sulphuric ether mixed with 2 qts. starch gruel. Fine hay, oatmeal, boiled potatoes, linseed meal may be given.

Garget.—This is an inflammation of the udder. The milk hardens, the animal is feverish, and has

chills followed by fever with disordered bowels. When in the case of young calves about to calve, it is well to draw a little milk each day before parturition. A poultice may be applied to the udder with holes for the teats and fastened over the back of the animal with a strap. If there should be suppuration and the matter does not escape of itself the swelling should be lanced.

Grub.—This is caused by the gad-fly piercing the skin and depositing its eggs. The only method is to destroy the larvæ which the fly has laid under the skin. This may be done by enlarging the orifice with a penknife and pressing out the larvæ. Rub the places with turpentine or kerosene oil.

Hernia.—This is a rupture and denotes a protrusion of the bowels through an opening of the abdomen. The displaced parts should be pushed back and retained in their place by a strap along the back and under the belly, with one around the neck.

Hoven.—This is an unnatural distention of the digestive organs and is produced by the fermenting of food in the stomach. Four drams of chloride of lime in a little water will give relief if given in the first stages. If the gas cannot be removed in any other way an opening is made into the stomach, but it is a dangerous remedy. A purgative should follow consisting of 12 oz. Epsom salts, ginger 1 oz., molasses 4 oz., mix with 2 qts. of water; the food should be light, and changed from hay to grass or from grass to hay gradually.

Inversion of the Uterus.—This is not common, but sometimes occurs at the time of calving or right after, and it is caused by the violent expulsive action of that organ at the moment of expelling the calf. This should be returned to place without rupturing the membrane, which would cause death. The head of the animal should be secured and the hind quarters raised a foot or more. Dip a sheet in warm milk and water and lay carefully over the protruding mass, cleanse thoroughly, and carefully return to place. After replacing the uterus inject an ounce of laudanum.

Jaundice.—This is a liver disease, the symptoms being a yellow tint of the eye which finally spreads over the whole skin. The following may be used:

Carbonate of soda 2 dr., cascarilla bark 3 dr., ginger 3 dr. in a pint of ale.

Sore Throat.—Mustard paste may be rubbed upon the throat, rubbing off after two or three hours and replacing, then apply a linseed poultice. A little of the following mixture may be syringed down the throat several times a day. Two ounces chlorate of potash in 1 qt. of water.

Leucorrhœa or Whites.—This is simply catarrh of the vagina and womb, which in appearance is a whitish fluid and very offensive in odor. A syringe of warm water will generally end the trouble.

Lice.—Cattle should never be permitted to have this pest. A sharp lookout must be kept. Lard may be applied warm and well rubbed in along the spine, neck, shoulders and sides of the body. Kerosene is also destructive.

Loss of Cud.—Give warm bran mashes and plenty of pure water with a moderate quantity of cut vegetables and apples.

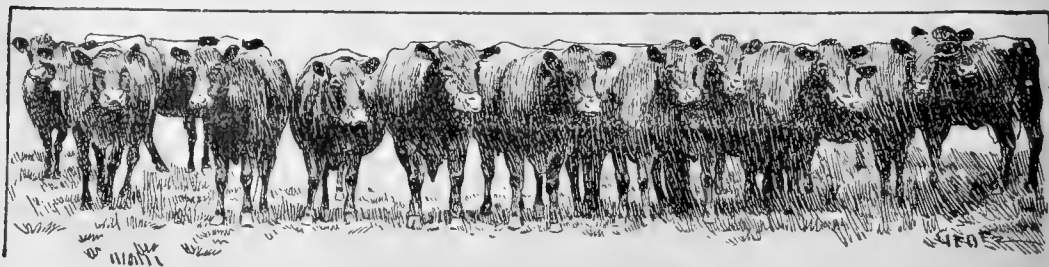
Pleuro-Pneumonia.—This is a disease of the lungs causing great weakness and prostration of the whole system. The best remedy is to kill the animal, and remove all danger from the rest of the herd.

Pneumonia.—This is common among cattle and has three stages.—Inflammation, the lung becoming solid, and suppuration. Keep the animal in a warm, well-ventilated stable, and if feverish cover the body with blankets wrung out in hot water to induce perspiration, using the same treatment as in bronchitis.

Puerperal Fever.—This is usually caused by difficult parturition, exposure to cold soon after calving or retention of the placenta. Symptoms are a high fever, hot, dry muzzle, hot or cold horns, loss of appetite, staring eyes, restlessness, scanty urine and constipation. If the udder is much swollen and hot, treat it with the water-bag, which is made of rubber large enough to inclose the udder, and comes up to the body flaring at the top, and is laid over the back with a strap. This is filled with warm soft-water, 65 degrees. Give a purgative, and keep the animal in a warm, clean stable.

Rinderpest or Cattle Plague.—Is hopeless of cure; thus the best thing to do is to kill the animal, and bury it where it will not contaminate anything.

Tuberculosis.—This is really consumption, and is to be most carefully looked for in every animal. They should be tested frequently, and if found diseased, should be killed.



RIGHT DRESS.

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In Early History.—This is a term applied to the various races of domesticated animals belonging to the genus *Bos*. They have been divided into two primary groups, the humped cattle, or zebus (*Bos indicus*), of India and Africa, and the straight-backed cattle (*Bos taurus*), which are common everywhere. By many naturalists these groups have been regarded as mere races of the same species, and it is a well-ascertained fact that the offspring arising from the crossing of the humped and unhumped cattle are completely fertile; but the differences in their osteology, configuration, voice and habits are such as to leave little doubt of their specific distinctness. Oxen appear to have been among the earliest of domesticated animals, as they undoubtedly were among the most important agents in the growth of early civilization. They are mentioned in the oldest written records of the Hebrew and Hindu peoples, and are figured on Egyptian monuments raised 2000 years before the Christian era; while the remains of domesticated specimens have been found in the Swiss lake-dwellings along with the stone implements and other records of Neolithic man.

Once a Medium of Exchange.—In infant communities an individual's wealth was measured by the number and size of his herds—Abram, it is said, was rich in cattle; and oxen for a long period formed, as they still do among many Central

African tribes, the favorite medium of exchange between nations. After the introduction of a metal coinage into ancient Greece, the former method of exchange was commemorated by stamping the image of an ox on the new money; while the same custom has left its mark on the languages of Europe, as is seen in the Latin word *pecunia*, and the English "pecuniary," derived from *pecus*, cattle.

In Mythology and Religion.—The value attached to cattle in ancient times is further shown by the Bull figuring among the signs of the zodiac; in its worship by the ancient Egyptians under the title of Apis; in the veneration which has always been paid to it by the Hindus, according to whose sacred legends it was the first animal created by the three divinities who were directed by the supreme Deity to furnish the earth with animated beings; and in the important part it was made to play in Greek and Roman mythology. The Hindus were not allowed to shed the blood of the ox, and the Egyptians could only do so in sacrificing to their gods. Both Hindus and Jews were forbidden, in their sacred writings, to muzzle it when treading out the corn; and to destroy it wantonly was considered a public crime among the Romans, punishable with exile.

Humped Cattle are found in greatest perfection in India, but they extend eastward to Japan, and westward to the African Niger. They differ from

the European forms not only in the fleshy protuberance in the shoulders, but in the number of sacral vertebræ, in the character of their voice, which has been described as "grunt-like," and also in their habits; "they seldom seek the shade, and never go into the water and there stand knee-deep like the cattle of Europe." They now exist only in the domesticated state, and appear to have been brought under the dominion of man at a very remote period, all the representations of the ox on such ancient sculptures as those in the caves of Elephanta being of the humped or zebu form. There are several breeds of the zebu, the finest occurring in the northern provinces of India, where they are used for riding,—carrying, it is said, a man at the rate of six miles an hour for fifteen hours. White bulls are held peculiarly sacred by the Hindus, and when they have been dedicated to Siva, by the branding upon them of his image, they are thenceforth relieved from all labor. They go without molestation wherever they choose, and may be seen about Eastern-bazars helping themselves to whatever dainties they prefer at the stalls of the faithful.

Less Common Uses.—The Hottentots and Kaffres possess several valuable breeds, as the Namaqua and Bechwana cattle, the latter with horns which sometimes measure over thirteen feet from tip to tip along the curvature. The cattle of those semi-barbarous South-Africans appear to be among the most intelligent of their kind,—certain of them, known as *backleys*, having been trained to watch the flocks, preventing them from straying beyond fixed limits, and protecting them from the attacks of wild beasts and from robbers. They are also trained to fight, and are said to rush into battle with the spirit of a war-horse. Among the Swiss mountains there are herds of cows, whose leaders are adorned with bells, the ringing of which keeps the cattle together, and guides the herdsman to their pasture-grounds. The wearing of the bells has come to be regarded as an honorable distinction by the cows, and no punishment is felt so keenly as the loss of them, the culprit giving expression to her sense of degradation by the most piteous lowings.

Their Services.—It is impossible to over-estimate their services to the human race. Living, the ox—taking that name as the representative of *Bos*—plows its owner's land, and reaps his harvest, carries his goods or himself, guards his property, even fights his battles, while its udder, which under domestication has been enormously enlarged, yields him at all seasons a copious supply of milk, butter and cheese. When dead, its flesh forms a chief class of animal food; its bones are ground into manure or turned into numerous articles of use or ornament; its skin is made into

leather, its ears and hoofs into glue; its hair is mixed with mortar; and its horns are cut and molded into various articles of use.

The Urus.—The most important ancestor of our present domestic cattle, in Europe and America, was the Urus (*Bos primigenius*). Cæsar describes it as existing in his time, in the Hercynian Forest, in size almost as large as an elephant, but with the form and color of a bull; and it is mentioned by Heberstein so late as the 16th century as still a favorite beast of chase. The Urus was characterized by its flat or slightly concave forehead, its straight occipital ridge, and the peculiar curvature of its horns. Its immense size may be gathered from the fact that a skull in the British Museum, found near Atholl, in Perthshire, measures one yard in length, while the span of the horn-cores is three feet six inches.

Survivals.—British wild cattle now exist only in a few parks, where they are strictly preserved. The purest bred are those of Chillingham, a park in Northumberland, belonging to the Earl of Tankerville, and which was in existence in the 13th century. These have red ears with brownish muzzle, and show all the characteristics of wild animals. They hide their young, feed in the night, basking or sleeping during the day; they are fierce when pressed, but, generally speaking, very timorous, moving off on the appearance of any one even at a great distance. The bulls engage in fierce contests for the leadership of the herd, and the wounded are set upon by the others and killed; thus few bulls attain a great age, and even those, when they grow feeble, are gored to death by their fellows. The white cattle of Cadzow Forest are very similar in their habits to those of Chillingham, but being confined to a narrow area are less wild. They still form a considerable herd, but of late years, it has been stated, they have all become polled, or hornless. Sir Walter Scott maintained that Cadzow and Chillingham are but the extremities of what in earlier times was a continuous forest, and that the white cattle are but the remnants of those herds of "*tauri sylvestres*," described by early Scottish writers as abounding in the forests of Caledonia, and to which he evidently refers in these lines:

"Mightiest of all the beasts of chase
That roam in woody Caledon,
Crashing the forest in his race,
The mountain bull comes thundering on."

Continental and South American Cattle.—Of these the Hungarian is conspicuous from its great size, and the extent of its horns, which often measure five feet from tip to tip. The cattle of Friesland, Jutland and Holstein form another large breed, and these, it is said, were introduced by the

Goths into Spain, thus becoming the progenitors of the enormous herds of wild cattle which now roam over the Pampas of South America. Columbus in 1493 brought to America a bull and several cows. Others were brought by succeeding Spanish settlers. They are now widely spread over the plains of South America, but are most numerous in the temperate districts of Paraguay and La Plata—a fact which bears out the view taken by Darwin, that our oxen are the descendants of species originally inhabiting a temperate climate. Except in greater uniformity of color, which is dark-reddish brown, the Pampas cattle have deviated but little from the ancestral Andalusian type. They roam in great herds in search of pasture, under the leadership of the strongest bulls, and avoid man, who hunts them chiefly for the value of their hides, of which enormous quantities are exported annually from Buenos Ayres. They are, however, readily reclaimed; the wildest herds, according to Prof. Low, being often domesticated in a month. These cattle have hitherto been chiefly valued for their hides, and as supplying animal food to the inhabitants, who use only the choicest parts; but lately attempts have been made, and with considerable success, to export the beef in a preserved state. Although the South American cattle have sprung from a single European breed, they have already given rise to many well-marked varieties, as the polled cattle of Paraguay, the hairless breed of Colombia, and that most monstrous of existing breeds, the Natás, two herds of which Darwin saw on the banks of the Plata, and which he describes as "bearing the same relation to other cattle as bull or pug dogs do to other dogs." Cattle have been introduced by the colonists into Australia and New Zealand, where they are now found in immense herds, leading a semi-wild existence on the extensive "runs" of the settlers.

BREEDS IN GREAT BRITAIN.

Taking up the most important of these breeds, and without entering into curious speculation on their origin, we will notice them in what seems a natural order. The first place belongs to

The Short-Horns.—It appears that from an early date the valley of the Tees possessed a breed of cattle which, in appearance and general qualities, were probably not unlike the *quasi* short-horns which are now so plenty. A Mr. Waistell of Allihill admired a certain bull, Hubback, but hesitated to buy him at the high price of 8*l*. He joined with a Mr. Colling in the purchase. Afterwards they sold to another Colling, who confined the bull to his own stock, refusing his use to even one of Mr. Waistell's cows. The Collings entered on their work of improvement at a very

favorable time, and with promising materials ready to their hands. But these materials seemed with them at once to acquire an unwonted plasticity; for in a very short time their cattle exhibited, in a degree that has hardly yet been excelled, that combination of rapid and large growth with aptness to fatten, of which their symmetry, good temper, mellow handling and gay colors are such pleasing indices and accompaniments, and for which they have acquired a world-wide celebrity. These *Durham*, *Teeswater* or *Short-Horn* cattle, as they were variously called, were soon eagerly sought after, and spread with amazing rapidity. For a time their merits were disputed by the eager advocates of other and older breeds, some of which they have utterly supplanted; while others, such as the *Herefords*, *Devons* and *Scotch* polled cattle, have each their zealous admirers, who still maintain their superiority to the younger race.

But this controversy is getting practically decided in favor of the *Short-Horns*, which constantly encroach upon their rivals, even in their head-quarters, and seldom lose ground which they once gain. Paradoxical as the statement appears, it is yet true that the very excellence of the *Short-Horns* has in many cases led to their discredit. Many persons desiring to possess them, and yet grudging the cost of pure-bred bulls, have used worthless cross-bred males, and so have filled the country with an inferior race of cattle, bearing indeed a general resemblance in color, and partaking in some measure of the good qualities of *Short-Horns*, but utterly wanting in their peculiar excellences. By ignorant or prejudiced persons the genuine race is nevertheless held answerable for the defects of the mongrels which usurp their name, and for the damaging comparisons which are made between them and choice specimens of other breeds. That the *Short-Horn* should spread as it does, in spite of this hinderance, is no small proof of its inherent excellence, and warrants the inference that it will take its place as the one appropriate breed of the fertile and sheltered parts of Great Britain.

The Hereford is the breed which in England contests most closely with the *Short-Horns* the palm of excellence. They are admirable grazer's cattle, and when of mature age and fully fattened, present exceedingly level, compact and massive carcasses of excellent beef. But the cows are poor milkers, and the oxen require to be at least two years old before being put up to fatten—defects fatal to the claims put forward in their behalf. To the grazier who purchases them when their growth is somewhat matured they usually yield a good profit, and will generally excel *Short-Horns* of the same age. But the

distinguishing characteristic of the latter is that, when properly treated, they get sufficiently fat and attain to remunerative weights at, or even under, two years old. If they are kept lean until they have reached that age, their peculiar excellence is lost. From the largeness of their frame they then cost more money, consume more food, and yet do not fatten more rapidly than bullocks of slower growing and more compactly formed breeds. It is thus the grazier frequently gives his verdict in favor of Herefords as compared with Short-Horns. Even under this mode of management Short-Horns will usually yield at least as good a return as their rivals *to the breeder and grazier conjointly*. But if fully fed from their birth so as to bring into play their peculiar property of growing and fattening simultaneously, they will yield a quicker and better return for the food consumed by them than cattle of any other breed. These remarks apply equally to another breed closely allied to the Herefords, viz.,

The North Devons, so much admired for their pleasing color, sprightly gait and gentle temper, qualities which fit them beyond all other cattle for the labor of the field. If it could be proved that ox-power is really more economical than horse-power for any stated part of the work of the farm, then the Devons, which form such admirable draught-oxen, would be deserving of general cultivation. It is found, however, that when agriculture reaches a certain stage of progress, ox-labor is inadequate to the more rapid and varied operations that are called for, and has to be superseded by that of horses.

Scotch Breeds.—These indigenous breeds of heavy cattle are for the most part black and hornless. Prominent among them are the *Aberdeen*, the *Angus* and the *Galloway*. These are all valuable breeds, being characterized by good milking and grazing qualities, and by a hardiness which peculiarly adapts them to a bleak climate. Cattle of these breeds, when they have attained to three years old, fatten very rapidly, acquire great size and weight of carcass, and yield beef unsurpassed in quality.

The cows of these breeds, when coupled with a Short-Horn bull, produce an admirable cross-breed, which combines largely the good qualities of both parents. The great saving of time and food which is effected by the earlier maturity of the cross-breed has induced a very extensive adoption of this practice in all the north-eastern counties of Scotland. Such a system is necessarily inimical to the improvement of the pure native breeds; but when cows of the cross-breed are continuously coupled with pure Short-Horn bulls, the progeny in a few generations becomes assimilated to the male parent, and are charac-

terized by a peculiar vigor of constitution and excellent milking yield in the cows. With such native breeds to work upon, and this aptitude to blend thoroughly with the Short-Horn breed, it is much more profitable to introduce the latter in this gradual way of continuous crossing than at once to substitute the one pure breed for the other. The cost of the former plan is much less, as there needs but the purchase from time to time of a good bull, and the risk is incomparably less, as the stock is acclimatized from the first, and there is no danger from a wrong selection. The greater risk of miscarriage in this mode of changing the breed is from the temptation to which, from mistaken economy, the breeder is exposed of rearing a cross-bred bull himself, or purchasing a merely nominal Short-Horn bull from others.

The Ayrshires stand in the front rank in Great Britain, as profitable dairy cattle. From the pains which have been taken to develop their milk-yielding power, it is now of the highest order. Persons conversant only with grazing cattle cannot but be surprised at the strange contrast between an Ayrshire cow in full milk and the forms of cattle which they have been used to regard as most perfect. Her wide pelvis, deep flank and enormous udder, with its small wide-set teats, seem out of all proportion to her fine bone and slender fore-quarters. The breed possess little merit for grazing purposes. Useful results are obtained by crossing these cows with a Short-Horn bull, and this practice is gaining ground. But the function of the Ayrshire cattle is the dairy. For this they are unsurpassed, either as respects the amount of produce yielded by them in proportion to the food which they consume, or the faculty which they possess of converting the herbage of poor exposed soils, such as abound in their native district, into butter and cheese of the best quality.

The Suffolk Duns.—These are a polled breed of cattle, the prevailing color of which is dun or pale red, for whose dairy produce the county of Suffolk has long been celebrated. They have a strong general resemblance to the Scotch polled cattle, but nevertheless seem indigenous to Suffolk. They are ungainly in their form and of little repute with the grazier, but possess an undoubted capacity of yielding a large quantity of milk in proportion to the food which they consume. They are now encroached upon by, and will probably give place to, the Short-Horns, by which they are decidedly excelled for the combined purposes of the dairy and the fattening-stall.

The Jerseys.—Four little islands lie off the north-west coast of France near Cherbourg, called the Channel Islands, belonging to Great Britain, the only parts of Normandy she has left.

These islands are four, Jersey, Guernsey, Alderney and Sark, the last a very small one, and the whole group has an area of only 73 square miles, and a population in 1871 of a little more than 90,000. Yet from this little group come the names Jersey, Alderney and Guernsey, names as familiar as household words in cattle and dairy matters. These cattle are so remarkable for the choice quality of the cream and butter obtained from their rather scanty yield of milk, that they are eagerly sought after for private dairies, in which quality of produce is more regarded than quantity. The rearing of heifers for the English market is of such importance to these islands that very stringent regulations have been adopted for insuring the purity of their peculiar breed. These cattle in general are utterly worthless for the purposes of the grazier. The choicer specimens of the Jersey have a certain deer-like form which gives them a pleasing aspect. In fact, in their native island there is a tradition that ascribes their progenitors to some mysterious cross with a deer, and their large, round, lustrous eyes lend credence to the conjecture. The race, as a whole, bear striking resemblance to the Ayrshires, which are alleged to owe their peculiar excellences to an early admixture of Jersey blood.

The Jersey cattle will claim large attention under Cattle in the United States.

The *Kyloes*, or *West Highland* cattle, are a mountain breed, widely diffused over the Highlands of Scotland, but are found in the greatest perfection in the larger Hebrides. Well-bred oxen of this breed, when of mature growth and in good condition, exhibit a symmetry of form and noble bearing unequalled among British cattle. Although somewhat slow in arriving at maturity, they are contented with the coarsest fare, and ultimately get fat where the daintier Short-Horns could barely exist. Their hardy constitution, thick mellow hide, and shaggy coat, peculiarly adapt them for a cold humid climate and coarse pasturage. The milk of these cows is very rich, but as they yield it in small quantity, and soon go dry, they are unsuited for the dairy, and are kept almost solely for the purpose of suckling each her own calf. The calves are generally housed during the first winter, but after that they shift for themselves out of doors the whole year round. Vast droves of these cattle are annually transferred to the lowlands, where they are in request for their serviceableness in consuming profitably the produce of coarse pastures and the leavings of daintier stock. When of a dun or tawny color, they have a picturesque look grazing in a park with deer. There is a strong family likeness between them and the

Welsh Cattle, which is what might be expected from the many features, physical and historical, which the two provinces have in common. Although the cattle of Wales are obviously, as a whole, of common origin, they are yet ranged into several groups, which owe their distinctive features either to peculiarities of soil and climate or to intermixture with other breeds. The *Pembrokes* may be taken as the type of the mountain groups. These are hardy cattle, which thrive on scanty pasturage and in a humid climate. They excel the West Highlanders in this respect, that they make good dairy cattle, the cows being peculiarly adapted for a small farmer's purposes. When fattened they yield beef of excellent quality. Their prevailing and most esteemed color is black, with deep orange on the naked parts. The *Anglesea* cattle are larger and coarser than the *Pembrokes*, and those of *Merioneth* and the higher districts are smaller and inferior to them in every respect. The county of *Glamorgan* possesses a peculiar breed, bearing its name, which has long been in estimation for combined grazing and dairy purposes. It has latterly been so much encroached upon by *Herefords* and *Short Horns* that there seems some likelihood of its becoming extinct, which will be cause for regret unless pains are taken to occupy its place with cattle not inferior to it in dairy qualities.

The *Shetland Cattle* are the most diminutive in the world. The carcass of a Shetland cow, when fully fattened, scarcely exceeds in weight that of a long-wooled wether. These little creatures are, however, excellent milkers in proportion to their size; they are very hardy, are contented with the scantiest pasturage, come early to maturity, are easily fattened, and their beef surpasses that of all other breeds for tenderness and delicacy of flavor. The diminutive cows of this breed are not unfrequently coupled with *Short-Horn* bulls, and the progeny from such apparently preposterous unions not only possess admirable fattening qualities, but approximate in bulk to their sires. These curious and handsome little creatures, apparently of Scandinavian origin, are so peculiarly fitted to the circumstances of their bleak and stormy habitat, that the utmost pains ought to be taken to preserve the breed in purity, and to improve it by judicious treatment.

HOLSTEIN CATTLE.

Their Habitat.—John Weiss tells of "the way in which the Dutch people were prepared to maintain liberty of thought and worship. A poor Frisian race was selected, and kept for centuries up to its knees in the marshes through which the Rhine emptied and lost itself. Here it lived in continual conflict with the Northern Ocean,

forced literally to hold the tide at arm's length, while a few acres of dry land might yield a scanty subsistence." From the land thus rescued from the German Ocean, come the cattle known as Dutch, Dutch-Frisian, and Holstein, the latter name being perhaps that most generally employed. The Holstein Herd-Book affirms that "the present large improved black-and-white cattle of North Holland, Friesland and Oldenburg, which all possess the same general characteristics, yet present in the different localities some slight dissimilarity, and have perhaps been brought to the highest degree of perfection in the first-named province, undoubtedly descended from the original stock of Holstein."

In the Seventeenth Century.—In this century, as represented by Motley in his History of the United Netherlands, the cattle interest in Holland had become of prime importance to the people, and was in the most thrifty condition. He says: "On that scrap of solid ground, rescued by human energy from the ocean, were the most fertile pastures in the world. An ox often weighed more than two thousand pounds. The cows produced two or three calves at a time, and the sheep four or five lambs. In a single village, four thousand kine were counted. Butter and cheese were exported to the annual value of a million; salted provisions to an incredible extent. The farmers were industrious, thriving and independent. It is an amusing illustration of the agricultural thrift and republican simplicity of this people that on one occasion a farmer proposed to Prince Maurice that he should marry his daughter, promising with her a dowry of a hundred thousand florins." And one can well imagine that the farmer's daughter, when the august head of John of Barneveldt rolled from the headsmen's axe, rejoiced that her blood had not been mingled with that of Maurice: in this and other transactions anything but a Prince.

In the Nineteenth Century, and at Home.—Prof. Roberts, before the New York Dairyman's Association, says: "I had the good fortune, during the past summer, to spend some time in North Holland and Friesland, a country usually ignored by the tourist, though full of instructive sights and quaint old customs. Here in ancient grass-bottomed lakes, snatched from the inroads of the sea, by the greatest skill and labor the world has ever known, I found the ideal milk-producer. Situated in a level, rich, moist country well adapted to the production of forage-grasses, with a climate cool but equable in summer, but raw, windy and cold in winter; here, favored yet unfavored by nature, these clean, plain, intelligent Dutch have reduced to a science the economical production of milk. Of course this could not be done without a good cow; and *if anywhere on*

the face of the globe there exists a race of uniformly good milkers, the Dutch have them. I care not what a man's prejudices be, whether an admirer of the fawn-eyed Jersey, or (like myself) of that grand old breed the Short-Horn, the stately Hereford or the piebald Ayrshire, if he really admire a good cow, he cannot help falling in love with the picturesque Holstein, as seen in its native pastures in the north countries. He may return to his American home and conclude that his circumstances are better adapted to some other breed, but he will ever after speak of them only with praise.

"I have said they were a race of good milkers; and I think I have not put it too strong when I say truthfully, that neither from Beemster Polder northward, nor in Friesland, did I see what might be called a poor cow or an old cow, though I saw many hundreds.

"Here is a people, occupying lands which are seldom sold for less than five hundred dollars per acre, more frequently for a thousand, and upwards, producing butter and cheese, and placing it on the European market in successful competition with that produced on lands of less than a tenth of their value. With these facts staring us in the face it looks quite possible that we might learn something of more economical production, from these *miscalled* dumb Dutch, notwithstanding they still cut their grass by hand, have no tongues or thills to their farm-wagons, and wear wooden shoes. Without a herd-book, till quite recently, and without any great leaders or improvers in cattle-breeding as found in Bakewell, Colling, Bates and Booth of England, these quiet people have, by common-sense and universal methods, long since formed a distinct breed of cattle that surpasses, in their locality, all others so far as tried. Jerseys have been introduced, but cannot secure a footing. Here and there at long intervals we find an effort has been made to improve by a cross of the English bull, but, so far as I could learn, deterioration in milking qualities has resulted with but slight compensating improvement in beef qualities. The details of the ancient breeding and management of the Holsteins have not been handed down to us, as that of the Short-Horns; but from the location and habits of the people we may fairly infer that they differed but slightly if at all from those of modern times. Having unusually fine facilities, I tried to study carefully their present methods, and also their results.

"In the first place, but few bulls are kept, and these but for two or three years at most, when they are sold in the market for beef. These bulls are selected with the utmost care, invariably being the calves of the choicest milkers. But little attention is paid to fancy points or color.

though dark spotted is preferred to light spotted; though more attention is now being paid to color in order to suit American customers. All other bull-calves with scarce an exception are sold as veals, bringing about one and a half times as much as with us. In like manner the heifer calves are sold except about twenty per cent, which are also selected with care and raised on skimmed milk. The age of the cow is usually denoted by the number of her calves, and in no case did I find a cow that had had more than six calves; usually only four or five. Their rule is to breed so that the cow's first calf is dropped in the stable before the dam is two years old, in order that extra care and attention may be given. There are other objects gained by this method; for should the heifer fall below their high standard she goes to the butcher before another wintering, and though she brought little profit to the dairy she will more than pay for her keeping, at the block.

"Here we find a threefold method of selection. First, in the sire; second, in the young calf, judged largely by the milking qualities of the dam; and lastly is applied the greatest of all tests, performance at the pail; and not till she answers this satisfactorily is she accorded a permanent place in the dairy.

"The cows, no matter how good, are seldom kept till they become 'old worn-out shells,' valueless for beef, and not fit to propagate their kind; but are sold for beef while they are vigorous enough to put on flesh, profitable alike to producer and consumer, and of no mean quality. I ate it for three weeks, and the English beef for two, and while not so fat as the Short-Horn, it was to my taste superior.

"My experience is not extended enough to justify me in saying that they are the best breed for us, all things considered, but I believe them to be."

Requirements at Home.—"The principles on which they practice, in selecting a cow to breed from, are as follows: She should have considerable size, not less than four and a half or five feet girth, with a length of body corresponding; legs proportionately short; a finely formed head, with a forehead or face somewhat concave; clear, large, mild and sparkling eyes, yet with no expression of wildness; tolerably large and stout ears, standing out from the head; fine, well-curved horns; a rather short than long, thick, broad neck, well set against the chest and withers; the front part of the chest and the shoulders must be broad and fleshy; the low-hanging dewlap must be soft to the touch; the back and loins must be properly projected, somewhat broad; the bones not too sharp, but well covered with flesh; the animal should have long curved ribs, which

form a broad breast-bone; the body must be round and deep, but not sunken into a hanging belly; the rump must not be uneven; the hip-bones should not stand out too broad and spreading, but all the parts should be level and well filled up; a fine tail, set moderately high up, and tolerably long but slender, with a thick, bushy tuft of hair at the end, hanging down below the hocks; the legs must be short and low, but strong in the bony structure; the knees broad, with flexible joints; the muscles and sinews must be firm and sound; the hoof broad and flat, and the position of the legs natural, not too close and crowded; the hide, covered with fine, glossy hair, must be soft and mellow to the touch, and set loose upon the body. A large, rather long, white and loose udder, extending well back, with four long teats, serves, also, as a characteristic mark of a good milch-cow. Large and prominent milk-veins must extend from the navel back to the udder; the belly of a good milch-cow should not be too deep and hanging."

THE ESCUTCHEON, OR MILK-MIRROR.

Francois Guenon, a native of Libourne, France, who became a cattle-dealer in 1822, discovered and perfected a system for learning the value of a cow as a milker, by observing her escutcheon, or milk-mirror, as it is often called, extending, in the best animals, from the root of the tail, down over the udder and behind the thighs. In 1837 the Agricultural Society of Bordeaux appointed a committee to investigate the worth of this system. That committee reported:

"Every cow subjected to examination was separated from the rest. What M. Guenon had to say in regard to her was taken down in writing by one of the committee; and immediately after, the proprietor, who had kept at a distance, was interrogated, and such questions put to him as would tend to confirm or disprove the judgment pronounced by M. Guenon. In this way we have examined in the most careful manner—note being taken of every fact and every observation made by any one present—upwards of sixty cows and heifers; and we are bound to declare that every statement made by M. Guenon, with respect to each of them, whether it regarded the quantity of milk, or the time during which the cow continued to give milk after being got with calf, or, finally, the quality of the milk as being more or less creamy or serous, was confirmed, and its accuracy fully established. The only discrepancies which occurred were some slight differences in regard to quantity of milk; but these, as we afterwards fully satisfied ourselves, were caused entirely by the food of the animal being more or less abundant."

Their conclusion is now substantially accepted.

The system must be applied "with brains, sir;" and so applied it has come to be of the greatest value to the seeker for milk.

Guenon claimed for his system that it determined:

1. The quantity of milk which a cow would yield.
2. The period which she would continue in milk.
3. The quality of her milk.

His description of the escutcheon is: "This mark consists of the figure, on the posterior parts of the animal, formed by the meeting of the hair that grows or points in different directions, the line of junction of these different growths of hair



ESCUTCHEON OF LADY MIDWOLD, IMPORTED FROM NORTH HOLLAND, BY WINTHROP W. CHENERY.

constituting the outline of the figure, or escutcheon. His system exhibits 27 different diagrams of varying grades of milking qualities, each grade with what he calls a "bastard" escutcheon. He uses this word "to denote those cows which give milk only so long as they have not been got in with calf anew, and which, upon this happening, go dry all of a sudden or in the course of a few days. Cows of this kind are found in each of the classes, and in every order of the class. Some of them are great milkers, but, so soon as they have got with calf, their milk is gone. Others present the most promising appearance, but their yield is very insignificant."

The hair indicating a good milker turns upward, is short and fine, and presents peculiar oval marks, or scurf-spots. The skin over this whole surface is easily raised, and is especially soft and fine in good milkers. Guenon's theory is that the more that upward growth of hair extends *outward* from the udder and inner parts of the thighs, and *upward* towards the urinary passage from the bladder, the better milker the cow is; and as the hair fails to extend upward and outward, in these directions, the less is she a good milker.

The rationale of the system, according to another French authority, *Prof. Magne*, of Alfort, is:

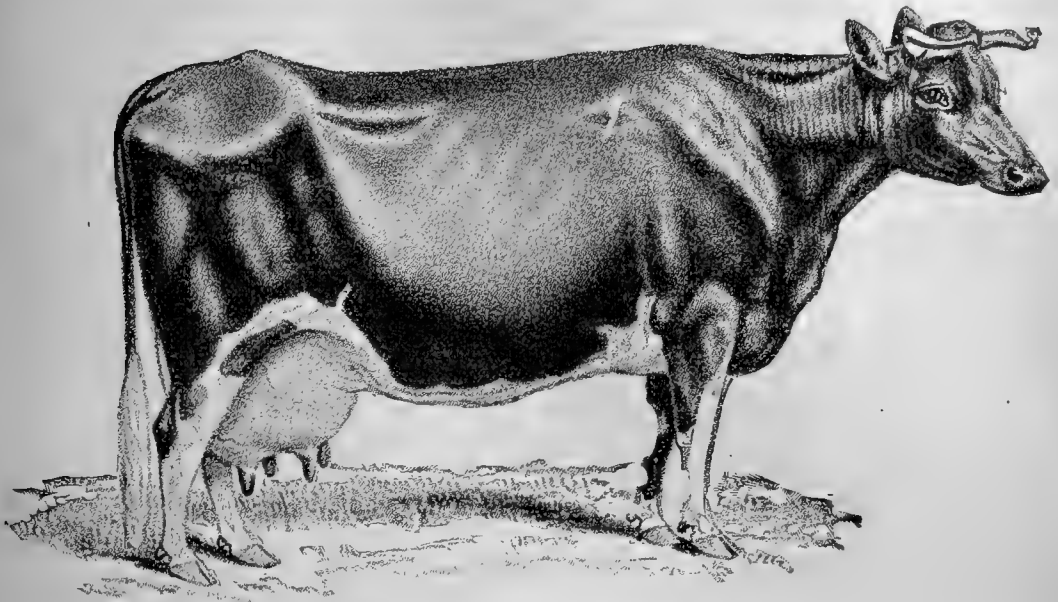
"The relations existing between the direction of the hair of the perinæum, and the activity of the milky glands, cannot be disputed. Large lower tufts are marks of good cows, whereas tufts near the vulva are observed on cows which dry up shortly after they are again in calf.

"But what is the cause of these relations? What connection can there be between the hair of the perinæum and the functions of the milky glands? The direction of the hair is subordinate to that of the arteries; when a large plate of hair is directed from below, upward, on the posterior face of the udder, and on the twist, it proves that the arteries which supply the milky system are large, since they pass backwards, beyond it, convey much blood, and consequently give activity to its functions. Upper tufts, placed on the sides of the vulva, prove that the arteries of the generative organs are strongly developed, reach even to the skin, and give great activity to those organs. The consequence is, that after a cow is again in calf, they draw off the blood which was flowing to the milky glands, lessen, and even stop the secretion of milk.

"In the bull, the arteries, corresponding to the mammary arteries of the cow, being intended only for coverings of the testicles, are very slightly developed; and there, accordingly, the escutcheons are of small extent."

While many dispute the value of the system in its entirety, and even adduce instances in which the facts seem diametrically opposed to the theory of M. Guenon, the general verdict is, that, like phrenology, there is a great deal in it, and that the escutcheons of both cows and bulls present evidence which no intelligent farmer or breeder can afford to disregard. The investigation has been from the start a fascinating one; and any reader who will go into it, studying the system in all the lights he can have access to, and trying it by all the facts within his reach, will find that the interest will not diminish as he goes on.

BREEDS OF CATTLE IN THE UNITED STATES.



Cow Echo. No. 121. H. H. B.

Working Oxen.—There are five distinct purposes for which cattle are bred and used here: for Working Oxen, for Beef, for Milk, for Butter and for Cheese or, taking the last three as one class, for work, for beef, and for the dairy. That their use as working oxen is the least important industry is an open conclusion, and the U. S. Census proves it thus:

Year.	Horses.	Mules and Asses.	Working Cattle.
1850...	4,336,719	550,331	1,700,744
1860.....	6,249,174	1,151,148	2,254,911
1870.....	7,145,370	1,125,415	1,319,271
1880.....	10,357,488	1,812,808	993,841

So that in 1850, with a population of 23,191,876, there was 1 horse to every 5.3 $\frac{1}{2}$, 1 mule or ass to every 44, and 1 working ox to every 13 $\frac{1}{2}$ inhabitants. In 1880, with a population of 50,155,783, there was 1 horse to every 5 nearly, 1 mule or ass to 27.6, and 1 working ox to every 50+ inhabitants. In 1850 New York led off with 178,909, and Missouri followed with 112,168; in 1860 Texas led off with 172,492, followed by Missouri with 166,588; in 1870 Texas again led off, but with the reduced number of 132,407, still followed by Missouri, which had fallen to 65,825; and in 1880 Texas again leads, but with only 90,502, a little more than half its number twenty years before, although its population had increased in the same time from 604,215 to 1,591,749. In 1880 Alabama ranks second with 75,534.

The working oxen industry is manifestly dwindling. Still nearly one million animals thus devoted in 1880 is in itself a large number. And a working ox disappears into a beef carcass with even greater promptness than a milch-cow.

Beef.—The census divides into Working-Oxen, Milch-Cows, and Other Cattle. But as the three merge at last, with insignificant exceptions, into Beef, we will give the story for the same period, from 1850 to 1880:

Year.	Milch-Cows.	Other Cattle.	Total Beef.
1850.....	6,385,094	9,693,069	17,778,907
1860.....	8,585,735	14,779,373	25,620,019
1870.....	8,935,332	13,566,005	23,820,608
1880.....	12,443,120	22,488,550	35,925,511

In 1850 there was a beef creature to about 1 $\frac{1}{2}$ inhabitants; in 1880, a beef creature to each 1.4 nearly—almost exactly the same proportion. In "other cattle," New York led off in 1850 with 767,406, followed by Ohio with 749,067; in 1860, Texas, which 10 years before had only 61,018, had gone to the front with 2,761,736, followed by Illinois with 970,799, and California with 948,731; in 1870 Texas kept the lead with 2,933,588, followed by Illinois with 1,055,499; in 1880 Texas still led with 3,387,927, followed by Iowa with 1,755,343, Illinois with 1,515,063, Missouri with 1,410,507, Ohio with 1,084,917, and Kansas with 1,015,935; no other State reaching a million.

The Dairy.—Although every animal kept for

dairy purposes is in the direct road to the shambles, still the path is interesting and often long, and the milch-cow occupies a place in the public eye and thought, not to say stomach, not accorded to the mere beef. The Census of the dairy interest for the same period is as follows, the number of milch-cows having already been given:

Year.	Butter. Pounds.	Cheese. Pounds.	Milk Sold. Gallons.
1850.....	313,345,606	105,535,893	
1860.....	459,681,372	103,663,927	
1870.....	514,092,683	53,492,153	235,500,599
1880.....	777,250,287	27,272,489	530,129,755

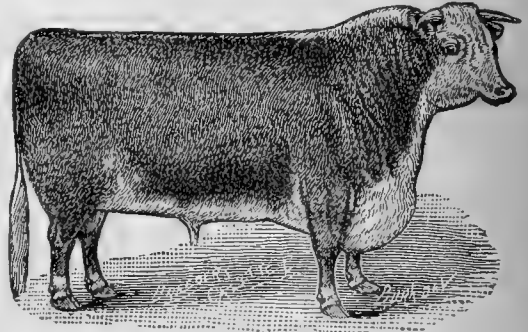
That is, in 1850 there were made about 13½ pounds of butter and nearly 4½ pounds of cheese for each person; in 1880 there were made about 15½ pounds of butter and a shade over half a pound of cheese for each person. "Milk sold" bears no appreciable proportion to milk used. In Butter production, New York led off in 1850 with 79,766,694 pounds, followed by Pennsylvania with 39,878,418 pounds; in 1860 New York still led with 103,097,289 and followed again by Pennsylvania with 58,653,511 pounds; in 1870 the same two States remain at the head in the same order with 107,147,526 and 60,834,644 pounds respectively; and in 1880 our old friends are still there, New York at the head with 111,922,423 and Pennsylvania with 79,336,012 pounds. St. Lawrence was the banner Butter county of New York, showing in 1870, 8,419,695, and in 1880, 6,973,020 pounds. But as St. Lawrence has an area of 2900 square miles, her return in 1880 shows about 2405 pounds to the square mile, while Franklin County, Vt., returns in 1880 4,066,240, or an average of 6465 pounds to each of its 629 square miles.

THE HEREFORDS.

This breed is a great favorite in the United States, and especially in the West, for working oxen and for beef. The first importation of them was made by Henry Clay, in 1816 or 1817, who put two pair of them upon his farm at Ashland, Ky., where they were allowed to run out, Mr. Clay shortly afterwards becoming a breeder of Short-Horns.

The Importation of 1840.—L. F. Allen writes: "The largest known importation of Herefords into the United States was made about the year 1840, upward of 20 in number, by an Englishman, into the City of New York, and taken to Jefferson County, of that State. A year or two afterwards the bulk of the herd were removed to the farm of Mr. Erastus Corning, near Albany, N. Y., and some of them went into Vermont, where they were for some years bred, sold and scattered. While the stock were at his farm, Mr. Corning sent their importer out again to Eng-

land to purchase more animals, which safely arrived, and were added to the herd. They were then successfully bred for several years, many sales made into different and distant parts of the United States, and they acquired considerable popularity. The herd was subsequently divided,

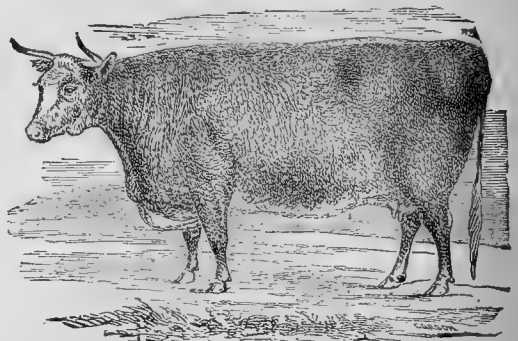


HEREFORD BULL.

Mr. Corning retaining his share, and his partner taking his away, where they ran out. Mr. Corning retained his herd at his farm, where he has successfully bred, and made sales from them since; and in the hands of his son, Mr. E. Corning, Jr., who is more an amateur than a professed cattle-breeder, added to by occasional importations from England, they remain fine specimens of their race.

"At different periods since 1840, importations have been made into both the United States and Canada, and scattered chiefly into the Western States and Territories for crossing on the native cows and rougher Texan ones for beef raising, as well as breeding in their pure blood. They command ready sales and good prices, are high in public favor, and add largely to the better qualities of beef-production. They have a Herd-Book of their own, and have taken an established position in the broad grazing districts of the country."

For Beef.—And Mr. Allen adds: "It is doubtful



HEREFORD COW.

whether in early maturity for the shambles they will equal the Short-Horns, now so universally prevalent, but as they are active in movement,

they may better suit localities where the lymphatic temperament of the Short-Horns will not so well enable them to range over wide distances to gather their forage. Taken altogether, the Herefords are a good breed of cattle, and will undoubtedly maintain a high position among our bovine varieties."

The Hereford Ox.—The Thompson Cyclopædia says: "As work oxen the Herefords are inferior to the Devons, when activity is wanted, but for heavy draft they have no superior, being muscular, steady and patient at the yoke. Their capacity for standing fatigue, and their constitutional hardihood and resistance to cold, are indeed remarkable, and of late years they have become great favorites with the ranchmen in the far Western States and Territories.

The Hereford Cow.—The Hereford cow compared with the ox is small and delicate, not always handsomely made, to the superficial observer, and shows its relationship to the Devon. She carries but little flesh in breeding condition, and when breeding, should not be fed so as to accumulate much fat, for, in order that the young be superior, the dam should have plenty of room inside. With the Herefords, experience has shown that the dam may not be too large or coarse, but she should be roomy. Then the breeder will get, even from apparently inferior cows, large, handsome steers, that will fatten early and kindly, and to great weights. When the cow is done breeding, and ready for fattening, she will spread out, and accumulate flesh and fat, and this to a greater degree than if not allowed to breed.

The Herefords are a hardy, gentle race maturing early, and long-lived. The flesh is superior, handsomely marbled, heavy in the prime parts, and they fatten to weights fully as heavy as any known breed.

Their massive strength, honesty and gentleness make them the best working oxen known, and the potency of the bulls, when crossed upon the red or nearly red cows of the country, renders the steers easily matched in color, as also in general characteristics of the progeny.

Points of the Hereford.—In judging the Herefords as beef animals, the same scale of points may be adopted as for Short-Horns, except that the Herefords are, if anything, more placid, closer to the ground, heavier in appearance, and, as a rule, thicker-meated than the present fashionable Short-Horns."

SHORT-HORNS HERE.

A great stride in the improvement of American cattle was the importation of the Short-Horns. Various spasmodic attempts at their introduction had been made when in 1834 an

association of cattle-breeders in the Scioto Valley, Ohio, sent an agent to England who purchased the best animals he could find, imported nineteen into Philadelphia, and drove them to Ohio. Other importations were made by this association and others, and in 1837 to 1839 a great English breeder named Whittaker sent over more than a hundred Short-Horns, which he sold at auction at good prices. These animals went into Pennsylvania, Ohio and Kentucky. In 1850 the herd of Thomas Bates was sold, and the best of his choice stock fell into the hands of Lord Ducie, already the owner of a noble herd. He died, and in 1853 a peremptory sale of his stock was widely advertised. At this sale Samuel Thorne, of Dutchess County, N. Y., bought several of the best and highest-priced animals, and added to them other choice animals from other herds. These were brought over and bred here, and with other importations and constant and successful attempts at improvement, the United States turned the scale, and has repeatedly sold to Englishmen Short-Horn stock to go back.

The Campbell Sale.—Samuel Campbell, Esq., of New York Mills, Oneida County, N. Y., furnishes another illustration of the adage that "it is the busiest man who has time." Although the manager of the great mills which give the place its name, he still had means, judgment, enterprise and enthusiasm to devote to the breeding of choice Short-Horn cattle, and held at his place, September 10, 1873, a sale "of the entire herd of pure-bred Short-Horns" on the farm. This sale was the high-water mark of prices for that description of cattle. His catalogue occupied fifty pages, and gave a long pedigree of each animal, some going back with twenty items. This catalogue was kept in type, and, after the sale, the name of each purchaser and the price paid were appended at the foot of the pedigree of each lot; and to all was prefixed a

SUMMARY OF THE SALE.

<i>Duchesses.</i>			
12 Cows and Heifers.	Average, \$19,937	Total, \$239,250	
3 Bulls.	" " 7,866	" " 23,600	
15 "	\$17,523	\$262,850	
<i>Oxfords.</i>			
7 Cows and Heifers.	Average, \$4,514	Total, \$31,600	
2 Bulls.	" " 1,900	" " 3,800	
9 "	\$3,933	\$35,400	
<i>Other Short-Horns.</i>			
73 Cows and Heifers.	Average, \$1,079	Total, \$78,825	
12 Bulls.	" " 317	" " 13,875	
85 "	\$972	\$82,640	
109 Animals.	General Average, \$3,494	Total, \$380,890	

Here is the Catalogue's story of the animal that brought the highest price:

- 19 8th DUCHESS OF GENEVA, red and white; calved July 28, 1866; got by 3d Lord Oxford (22200),
- Dam 1st Duchess of Geneva by 2d Grand Duke (12961),
- Duchess 71st by Duke of Glo'ster (11382),
- Duchess 66th by 4th Duke of York (10167),
- Duchess 55th by 4th Duke of Northumberland (3649),
- Duchess 38th by Norfolk (2377),
- Duchess 33d by Belvedere (1706),
- Duchess 19th by 2d Hubback (1423),
- Duchess 12th by The Earl (646),
- Duchess 4th by Ketton 2d (710),
- Duchess 1st by Comet (155),
- Duchess by Favourite (252),—by Daisy Bull (186),—by Favourite (252),—by Hubback (319),—by J. Brown's Red Bull (97).

Bulled June 1, by 2d Duke of Oneida.

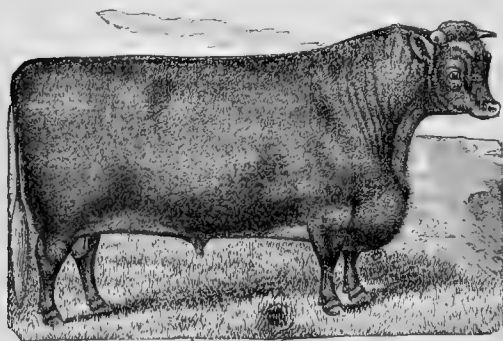
R. Pavin Davies, England.....\$40,600

The total record of animals sold to go to England was:

8th Duchess of Geneva.....	\$40,600
10th Duchess of Geneva.....	35,000
12th Lady of Oxford.....	7,000
1st Duchess of Oneida.....	30,600
Atlantic Gwynne.....	2,000
3d Duchess of Oneida.....	15,600
Lady Worcester.....	2,000
8th Duchess of Oneida.....	15,300
9th Duchess of Oneida.....	10,000
Prince Alfred.....	600

10 animals, averaging \$15,870.....\$158,700

As Dairy Animals.—For years the Short-Horns held a high, perhaps the highest, place in public favor. But such superior dairy qualities have been

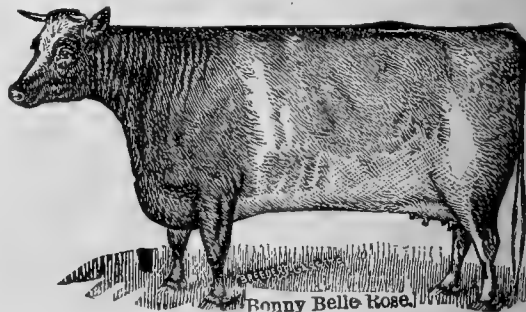


SHORT-HORN BULL.

lately developed in other breeds, that the Short-Horn has lost its lead for milk and butter. Sixty-six pounds of milk a day was a high yield for a Short-Horn cow abundantly fed, and milked three times. But for beef, the Short-Horns still deservedly rank high. Youatt and Martin relate that these cattle first attracted general notice by the production of a Durham ox which at 5 years old weighed 3024 pounds, was carried around for years as a show, but dislocated his hip at the age of 11 years, and was killed weighing 3780 pounds. And this weight, they say, was not chargeable to his superior size, but to "the excessive ripeness of his points." Allen

says: "It is held, as a flesh-producing animal, that in early maturity, weight of meat, ripeness of points, and giving the most flesh in the best places, the great merit of the Short-Horn is found. He who feeds cattle for the general market wants the animal which makes the quickest and most profitable returns for the capital invested and the food consumed. The Short-Horn at three years, past, well fattened, is fit for slaughter, equally with the Devon or Hereford at the same age, or the Highland Scott or Galloway at four years, or the 'native' at five or six years. He is claimed by many to be a less feeder for his weight. There may be truth in this, as he is less active, and more inclined to take his rest, than the lighter breeds, which are less sluggish in their habits."

Proper Homes of the Short-Horns.—This very characteristic of quietness and tendency to slug-



SHORT-HORN COW.

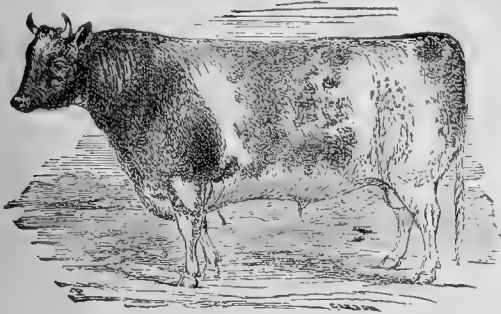
gishness, which so tells in their favor under certain conditions, is against them in certain others. They must have abundant feed and good pasturage. Broken lands, with short grasses, do not answer well with them. They need level or gently undulating soils, with luxuriant grasses upon them. On lean, hungry soils, with scanty herbage, other breeds, such as the Devon, Highland and Galloway, will do better. A cold climate, in which they are well taken care of, does not seem to disagree with them. Latitudes from 40° to 45° north seem to suit them as well as warmer ones, provided they have good winter protection. The severe winters of the North are no bar to their success. Wherever the proper herbage will grow—blue grass, for instance—they may be successfully raised; but they must be taken care of. The New York office of the Short-Horn Herd-Book, and headquarters generally of that race of cattle, is at the store of R. H. Allen & Co., 191 Water St. The Secretary of the Club is Lewis F. Allen, Black Rock, N. Y.

Rationale of Short Horns.—Prof. Hengerveld says, in writing of the Dutch Frisian cattle: "It is even supposed that the shortness of the horns has a great deal to do with the fineness of

the shape. Though it may not be true in every respect, yet the exquisiteness of form and quality depends much upon the network of the horns and the fineness of the hair. It may be shown on physiological grounds that long horns take away nutritive matter, especially azotic substances, to the great disadvantage of the bodily development, and consequently to the production of beef and milk. Breeders are therefore quite right in paying particular attention to the shortness of the horns."

THE AYRSHIRES.

Allen says of these: "Their trial here has been successful. They are hardy, healthy, well fitted to our climate and pastures, and prove good milkers both in the imported originals and their progeny. Their flow of milk is good in



AYRSHIRE BULL.

quantity and fair in quality; yet in this country they do not yield so much in quantity as it is alleged they have produced in Scotland. The chief reason for this is obvious. Ayrshire has a moist climate, an almost continuous drizzle of rains or moisture pervading it, making fresh, green pastures; a cooler and more equable temperature in summer, and warmer in winter than ours. Our American climate is liable to extremes of cold in winter, heat in summer, and protracted droughts, for weeks, drying up the herbage. These differences alone account for a diminished quantity in the yield of milk from the Scotch to the American Ayrshires." And he adds: "We have little doubt that the Ayrshires owe their chief qualities, both in milk as well as in form and color, to their Short-Horn progenitors on one side."

Their Claims in America.—Mr. T. S. Gold, of West Cornwall, Conn.: "For the ability of Ayrshires to thrive on scanty pasturage, to pick a living, for soundness of constitution and freedom from any hereditary taints, for strength of blood,—*i. e.*, when graded upon other stock the powers of imparting to the progeny in large degree their own characteristics,—they have no superiors among neat stock of any breed or of no breed. Of compact form, fine in bone, and in all parts

of which the body is composed, there is no waste of horn or bone, or superfluous flesh, to build up, and maintain; but these parts are all balanced, forming a symmetrical whole that at once commends itself to the lover of good cattle, and even when his vision is dimmed and perverted by always looking for the fine red of the Devon or the imposing form of the Durham, he still sees in the Ayrshire a very fine animal, if it only had a *good color*, or if it was not *lacking in size*."

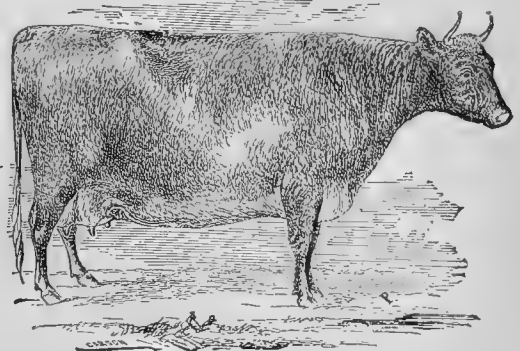
"A word about the Ayrshires as workers. But few in this State have been broken to the yoke; but whenever this has been done, as far as my experience goes, they show great spirit as workers, great endurance, all those qualities which we esteem in working oxen. I have a pair of Ayrshire stags, six years old, that for three years have been in the yoke almost every working day, and that for their weight will out-pull anything I have ever owned, I think I am safe in saying that I have ever seen."

Some of their Milk Records.—J. D. W. French, North Andover, Mass., reports for nine years:

In 1874,	3 cows	yielded	6934	lbs. milk.
" 1875,	11 "	" "	6218	" "
" 1876,	12 "	" "	5310	" "
" 1877,	12 "	" "	5343	" "
" 1878,	10 "	" "	5316	" "
" 1879,	13 "	" "	5222	" "
" 1880,	13 "	" "	5720	" "
" 1881,	17 "	" "	5041	" "
" 1882,	18 "	" "	5083	" "

In 9 years, 109 Total, 50,189
" " Average per cow, 4604 lbs. = 2141 qts.

He describes Roxanna as "one of the largest producers, having yielded in one year more than



AYRSHIRE COW.

8000 pounds, and in five years 17 tons, of milk. The feed was moderate, intended to keep the animals in good breeding condition rather than to force a large milk record." "In summer the feed has been pasturage; sometimes, in addition, green fodder or shorts, on account of shortness of feed from drought. In winter, the daily ration was hay, eight quarts mangolds and four quarts grain."

C. M. Winslow, Brandon, Vt., reports a herd of 13 cows, summed up thus:

Average weight of cows	1020
" " " milk per cow for 1880	5910
" " " " " " " 1881	6176
" quarts " " " " " 1881	2889

or about 6030 pounds. He also reports single year's records, of Queen of Ayr an average of 940 $\frac{1}{2}$ pounds for six consecutive years after she was ten years old; Lily Dale, 8984 pounds in 366 days; and two own sisters of Prince of Ayr, of 10,426 and 10,801 pounds.

Much larger yields of milk are reported from Scotland than in the United States, a single cow belonging to the Duke of Athol having produced 13,456 pounds, or 1305 gallons.

But public interest attaches now especially to two great leading classes. One of these is that from the Channel Islands, at the head the Jerseys, and affiliated with these, the Alderneys and the Guernseys. The other comprises the breeds from high latitudes in Western Europe, where they are divided as Highland and Lowland, the latter even as far north as Labrador, and known here as Dutch Frisian and as Holstein.

The Secretary and Editor of the Association of Ayrshire Breeders, is C. M. Winslow, Brandon, Vermont.

POLLED CATTLE.

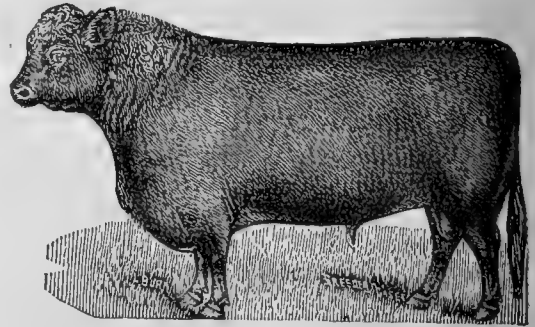
Allen says that in 1837 he saw a very fine black, polled Galloway cow, at the General Hospital, Philadelphia, but could not ascertain how she came there. He goes on to tell how they have become established in the United States:

"About the year 1850, some enterprising Scotch farmers made the first importations of Galloways into the vicinity of Toronto, in Canada West. They already had the Short-Horns there, of high quality, imported many years before, and some of them were kept and much liked by the same farmers who brought out the Galloways. But the latter were the cattle of their native land, and they longed for, and sought, the cattle of their native hills and heather. There must have been several different importations, for in the year 1857 we saw upwards of forty of them exhibited by competing owners at a Provincial agricultural show, at Brantford, and have since met them in equal numbers at other shows in the Province.

"They were fine cattle—full, round, and comely in form; robust in appearance; showing a ready aptitude to take on flesh; elastic to the touch; a good skin, with long, thick, wavy hair; of placid look, and apparently kindly temper. In addition to these good qualities, some of their owners declared them to be 'good milkers.' But their indications in that line did not show it, al-

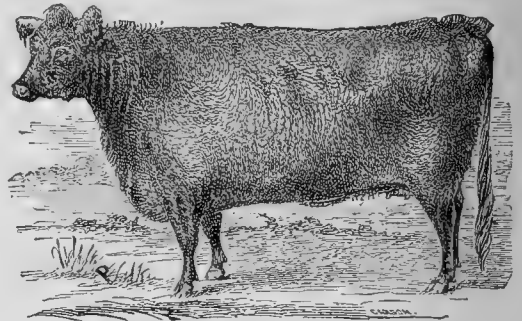
though, in practice, there may have been exceptions to what we thought indicated an opposite tendency. Their colors were black, generally, although we found one or two dull reds, or duns, and a brindle (black and red mixed), among them—which colors, according to Youatt, are admissible. Taken altogether, the cattle fully answered his description.

"Within the last few years several importations of the improved Galloway (now more usually called Angus, and Aberdeen Polled, as they have



GALLOWAY BULL.

been for many years bred and improved in Aberdeenshire and other eastern counties of Scotland) have been made into the United States. The first importation of particular note was made by a Scottish gentleman, Mr. Grant, into Kansas, who bred them with spirit and intelligence in considerable numbers, and where they still remain in the hands of his successors. Crossed on the native cows of that region, they have



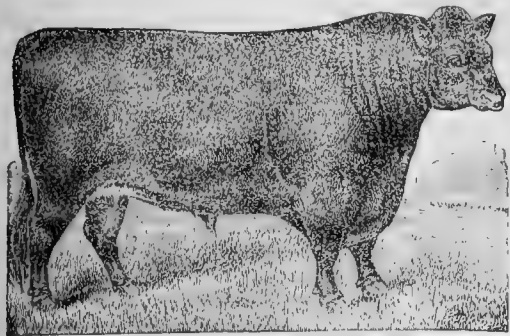
GALLOWAY COW.

achieved a deserved reputation as beef-producers, and are extending in demand for the broad ranches of the West.

"Their main excellence is in beef production. They are of full average size with our largest common cattle, mature as early as the Herefords, and in the absence of horns are by some preferred as safer in transportation on the railroads to distant city markets. The bulls have a remarkable prepotency, like other distinct breeds, to impress their characteristics on the miscellaneous-bred native cows upon which they are used—a

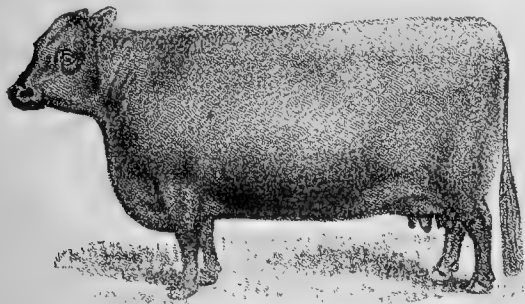
single cross making an individuality of appearance and quality every way favorable to their use. The cows do not excel as milk-producers, and will not be sought for dairy purposes. Their milk, however, is rich in cream, and according to the quantity yielded gives a satisfactory amount of butter and cheese. They have established a permanent reputation among the various breeds which will be maintained in our future beef production."

The Polled Angus.—These cattle have much of the Galloway form, and they might be mistaken,



ABERDEEN-ANGUS BULL.

one for the other, by an unaccustomed eye. But the Angus are larger, longer in the leg, thinner in the shoulder, and flatter in the side. They are generally black or with a few white spots, but often yellow, either brindled, dark red or silver-colored yellow. That they are taking firm root in this country, may be seen, among other



ABERDEEN-ANGUS COW.

indications, from a sale in Kansas City, Mo., April 11, 1883, where

- 10 Aberdeen or Angus cows sold for \$6300; average, \$630.
- 32 Aberdeen or Angus bulls sold for \$15,955; average, \$498.59.
- 6 Aberdeen or Angus cows sold for \$4560; average, \$760.
- 5 Aberdeen or Angus bulls sold for \$2860; average, \$572.
- 19 Galloway cows and heifers sold for \$10,370; average, \$545.79.
- 54 Galloway bulls sold for \$27,440; average, \$508.14.

Some grade yearling polled bulls sold for \$180 each; and grade polled cows for \$150 to \$250.

At another three days' sale at the same place, later in the same month,

- 14 Aberdeen-Angus cows and heifers sold for \$9260; an average of \$661.42.
- 26 Aberdeen-Angus bulls sold for \$11,325; average, \$435.57.
- 11 Aberdeen-Angus cows and heifers sold for \$10,505; average, \$955.
- 47 Aberdeen-Angus bulls sold for \$28,000; average, \$595.74.
- 60 Galloway cows and heifers sold for \$24,100; average, \$401.66.
- 5 Galloway bulls sold for \$2440; average, \$488.

These figures we copy from two numbers of the *Breeder's Gazette*, Chicago, Ill. An examination of one number of that paper, and especially of its advertising columns, will well repay any person interested in the present and future of cattle, horses, sheep and swine.

THE JERSEYS.

The pre-eminence of these cattle lies in the amount and especially in the quality of the milk yielded by their cows. Their breeders, while willing sometimes to admit that other cows may approach them in amount of milk, claim that in the richness of their milk, the Jerseys are unsurpassed. And here the reports seem to leave the Alderneys and the Guerneys far behind the cows of their sister-island. The best record of a Guernsey cow that has reached the writer is that of Mr. Ledyard's cow *Elegante*, who is credited with about 60 pounds of milk in a day, and 19 to 19½ pounds of butter in a week, with other cows producing 16 to 18 pounds of butter in a week.

Echo Farm.—This most interesting and attractive dairy-farm was the subject of an instructive article in *Harper's Magazine* for Oct. 1878. It was originated by F. R. Starr, "a gentleman of education, intelligence and wealth," who bought a farm in Litchfield, Conn., about 1869 as a summer home, became interested in choice stock, and *Echo Farm* was the outcome, devoted to Jerseys as dairy stock; and the investment became, perhaps unexpectedly to the owner, a profitable one. Since that article was written, the business has greatly increased, the farm and number of animals enlarged, new buildings added, and the enterprise is in the hands of the "Echo Farm Company, Full-Blooded Jersey stock, entered in the 'American Jersey Cattle Club Herd Register,' a Specialty." They deliver milk at ten cents a quart and butter at one dollar a pound, to customers in New York and Brooklyn daily, and find ready sale for what they make. From this farm comes the best accessible report of a yearly yield of milk from Jersey cows, namely, Starr's

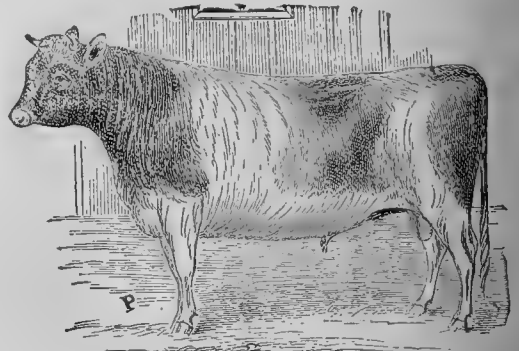
Locust, 9528 pounds. This is a comparatively insignificant yearly milk record. But as there are "deacons and deacons," so there is milk and milk. When the question comes up, What cows will produce the most butter? the Jerseys make a magnificent showing. Conrad Wilson, in *Harper's Magazine*, Jan. 1883, gives a list of the butter yield for one year of 10 Jersey cows, the highest with a record of 778 pounds, and the lowest with 500, the aggregate of the 10 adding 5965 pounds of butter, or 596½ pounds per cow, nearly 11½ pounds per week.

Greatest Yield of Butter in One Week.—June 28, 1883, a seven days' test of the Jersey cow, Value 2d, No. 6844, owned by Watts & Seth, of Baltimore, Md., was completed by a committee of the Maryland Improved Live-Stock Breeders' Association, and Col. C. M. Weld, of New York, on the part of the American Jersey Cattle Club. The cow was milked at intervals of eight hours, yielding 327 pounds of milk, from which was produced 25 pounds and 2¼ ounces of butter. The cow was bred in New Jersey, and was purchased last fall by her present owners for \$2000. She is pronounced the best butter-producing cow in the United States.

Even with this showing, it is claimed that June 23, by the opening of a faucet, exactly 2 pounds of milk were lost, which would have added 2¾ ounces of butter, bringing the week's product to 25 pounds 5¼ ounces. The weight of the week's milk was 327 pounds, or 42¾ pounds per day; and there was a pound of butter to show for nearly 13 pounds of milk. Mr. Seth writes: "As neither accurate weights nor measures were used, I am unable to say what amount of food was given her. Of grain, she had corn chop, bran, cotton-seed meal and linseed meal. She was fed three times a day; morning and evening corn, bran and cotton-seed, and at noon a small quantity of linseed meal was substituted in the place of the cotton-seed. For three nights after the last milking she had a small quantity of oatmeal gruel, made of, say, ½ pound of dry meal. Her green food consisted of cut clover and orchard grass mixed, and oats and peas mixed, on alternate days; besides, she had the run in the morning of about one acre of old pasture that had been completely grazed off this season. At night, she was put into another lot of about one acre, mostly wood, with a little orchard grass outside of the wood, on which three cows, herself included, had been running for three weeks. These runs were given her for air, shade and water principally. Of pasturage, strictly speaking, I have none, as I soil my cattle entirely, and for the whole period she was fed with reference to the preservation of good health, hoping for as good a yield as was

consistent therewith." The weight of "Value 2d," was, at the time of this trial, 955 pounds.

The Jerseys To-day.—The American Encyclopædia of Agriculture says of them: "The butter from the cows is very rich in cream and deep yellow in color, so much so that a few cows in a herd will decidedly change the color of the butter of the whole herd. The percentage of cream to milk varies from 18 to 25 per cent., and the proportion of butter to cream varies from 3.70 to 8.07 in 100 parts. Twenty-six quarts per day has been recorded as the product of an individual cow, and 14 pounds of butter per week. Sixteen quarts per day may be regarded as a good yield, and when we take into consideration the light



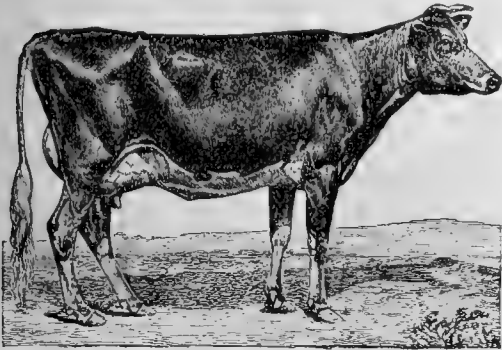
JERSEY BULL.

weight of the cow, and the fact that the milk will yield from one sixth to one quarter of the richest cream, we need not wonder that those gentle and deer-like cattle have become universal favorites as family cows.

Description.—Lewis F. Allen, the leading editor of the Short-Horn Herd-Book, and probably not unduly prejudiced in favor of any other breed: "Beginning with the head, the most characteristic feature, the muzzle, is fine; the nose either dark brown or black, and occasionally a yellowish shade, with a peculiar mealy, light-colored hair, running up the face into a smoky hue, when it gradually takes the general color of the body. The face is slightly dishing, clean of flesh, mild and gentle in expression; the eye clear and full, and encircled with a distinct ring of the color of the nose; the forehead bold; the horn short, curving inward, and waxy in color, with black tips; the ear sizable, thin, and quick in movement. The whole head is original, and blood-like in appearance—more so than in any other of the cattle race—reminding one strongly of the head of our American elk. The neck is somewhat depressed—would be called ewe-necked by some—but clean in the throat, with moderate or little dewlap; the shoulders are wide and somewhat ragged, with prominent points, running down to a delicate arm,

and slender legs beneath. The ribs are fat, yet giving sufficient play for good lungs; the back depressed and somewhat hollow; the belly deep and large; the hips tolerably wide; the rump and tail high; the loin and quarter medium in length; the thigh thin and deep; the twist wide, to accommodate a clean, good-sized udder; the flanks medium; the hocks, or gambrel-joints, crooked; the hind legs small; the udder capacious, square, set well forward, and covered with soft, silky hair; the teats fine, standing well apart and nicely tapering; the milk-veins prominent. On the whole she is a homely, blood-like, gentle, useful little housekeeping body, with a most kindly temper, loving to be petted, and, like a pony with the children, readily becomes a great favorite with those who have her about them, either in pasture, paddock, stable or the lawn. The colors are usually light red or fawn, occasionally smoky gray, and sometimes black, mixed or splashed more or less with white."

A Milk, not a Dairy Cow.—The American Farmer's Pictorial Cyclopædia of Live Stock sums up the



JERSEY COW.

matter: "In the strict sense of the word the Jersey is not a dairy cow. She is essentially the cow for rich milk, but not a cheese-maker; she lacks size to give quantity in this respect. The butter globules are not only larger than in other breeds, but the covering, the film enveloping the fat globules, is weaker. Hence the globules give up the butter easily in churning. The cream is also high-colored from the excess of yellow pigment it contains.

"For the family requiring milk rich in cream and butter, the Jerseys will always be desirable, and, since they have taken kindly to our climate in nearly every section of the Union, and even in Canada, they have, from their docile and tractable dispositions, become universal favorites where kindly treated. The bulls are not always good-tempered, and hence require not only a firm hand but careful management; and the cow, if abused, will by no means fail to resent the brutal treatment."

Points.—The following scale was prepared for the guidance of judges at agricultural fairs by the American Jersey Cattle Club, adopted April 1, 1875:

Points.	Counts.
1. Head small, lean and rather long.....	2
2. Face dished, broad between the eyes and narrow between the horns.....	1
3. Muzzle dark, and encircled by a light color.....	1
4. Eyes full and placid.....	1
5. Horns small, crumpled and amber-color.....	3
6. Ears small and thin.....	1
7. Neck straight, thin, rather long, with clean throat, and not heavy at the shoulders.....	4
8. Shoulders sloping, and lean; withers thin; breast neither deficient nor beefy.....	3
9. Back level to the setting on of tail, and broad across the loin.....	4
10. Barrel hooped, broad and deep at the flank.....	8
11. Hips wide apart, and fine in the bone; rump long and broad.....	4
12. Thighs long, thin and wide apart; with legs standing square; and not to cross in walking.....	4
13. Legs short, small below the knees, with small hoof.....	3
14. Tail fine, reaching the hocks, with good switch.....	3
15. Hide thin and mellow, with fine soft hair.....	4
16. Color of hide where the hair is, white; on udder and inside of ears, yellow.....	5
17. Fore udder full in form, and running well forward.....	8
18. Hind udder full in form, and well up behind.....	8
19. Udder free from long hair, and not fleshy.....	5
20. Teats rather large, wide apart and squarely placed.....	6
21. Milk-veins prominent.....	5
22. Escutcheon high and broad, and full on thighs.....	8
23. Disposition quiet and good-natured.....	3
24. General appearance rather bony than fleshy.....	6
Perfection.....	100

In judging heifers, omit Nos. 17, 18 and 21.

The same scale of points shall be used in judging bulls, omitting Nos. 17, 18, 19 and 21, and making moderate allowance for masculinity.

NOTE.—It is recommended that judges at fairs do not award prizes to animals falling below the following *minimum* standard, viz.: cows, 70 counts; heifers, 55 counts; bulls, 50 counts.

Comparative Value of Points.—The gist of the advice of the Jersey Herd-Book: The highest excellence of any milking cow lies in the udder. This must not only be full in form, that is in line with the belly, but it must not be cut off square in front, like that of a goat. It should be rounded, full, presenting great breadth behind, and carried well up between the thighs. The milk-veins should be full and carried well forward toward the forelegs. If knotted and with curves so much the better.

The tail is another essential point. Whatever its size at the root, it *must* be large and tapering, and have a good switch of hair.

The chest should be broad and deep: this shows good respiration, essential to feeding and health. But in the dairy cow, especially when viewed from before, there will be no appearance of massiveness. On the contrary, she will give an appearance of delicate fineness, and will look large behind, swelling gradually from behind the shoulders. She may not be closely ribbed, in fact should not be close, only comparatively so.

The best milkers, everywhere, will be found to be rather loosely put together between the last rib and the hips, and good milkers must be roomy in the flank.

The hind quarters must be long from the point of the rump to the hock, and well filled up; yet this does not mean rounded and massive in flesh; on the contrary, the best milkers will be rather lean and perhaps high-boned. Nevertheless the same animal, when out of milk and fat, may fill up; and perhaps present a fully rounded contour, while yet possessing all the delicacy of points characteristic of the high-bred dairy cow.

A cow may have large and heavy ears; her back may not be fully straight from the withers to the top of the hips; her rump may be sloping; her tail may not reach the hocks;—all these are defects, the latter a serious one, yet if the milking organs are super-excellent it will outweigh all these.

The office of the American Jersey Cattle Club is at 49 Cedar Street, New York; Thomas J. Hand, Secretary. Headquarters of Guernsey Cattle Club are at Farmington, Conn.; Edward Norton, Secretary.

THE HOLSTEINS.

Their Introduction Here.—Holstein cattle were brought into this country about 1625 by the "West India Company." In 1810 a bull and two cows were brought over by William Jarvis, and put on his farm in Weathersfield, Vermont. Although they did well, they were allowed to mix with other breeds, and to run out. Various importations were made, beginning in 1852 with a single cow. The extraordinary good qualities of that cow led, in 1857, to the further importation of a bull and two cows, and in 1859 to that of four more cows. Other importations were made from time to time. But the start of the breed acquired here may be said to date from the bringing over in 1861, by Winthrop W. Chenery, of a bull and four cows, and their establishment on the Highland Stock Farm, Belmont, Mass., and form the basis of our present Holstein stock. The animals came from the vicinity of Beemster and Purmerend, in North Holland, and formed the ground-work of the present Holstein stock in this country. From that time repeated importations have taken place, Americans constantly scrutinizing the original habitat of the breed, and bringing over the best cows and bulls. Here is a summary of a Catalogue of imported heifers in quarantine till December 12, 1883, on the farm of the Unadilla Valley Herd, S. Hoxie, Whitestown, N. Y., giving the number of the importation, name, time of calving, and the milk rate of the mother with this calf for one day and for ten days:

No. in importation.	Name.	Calved.	Largest yield of milk		Ear-mark.*
			1 day.	10 days.	
			lbs.	lbs.	
1	Dockwour 2d	March 7, 1882	70.4	690.8	117
2	Hanna	March 1, 1882	57.2	558.8	137
3	Lady Seffinga 2d	March 19, 1882	83.6	796.4	126
4	Vierhuisber	March 3, 1882	50.6	475.2	118
5	Qwartje 2d	April 3, 1882	74.8	712.8	136
6	Anneke 4th	May 4, 1882	77.0	748.0	116
7	Lady Rietruma	March 3, 1882	44.0	431.2	154
8	Babus	March 29, 1882	50.4	580.8	155
9	Niemke	March 25, 1882	72.6	695.2	176
10	Porseleintje 2d	March 22, 1882	72.6	190
11	Melkbron 3d	March 32, 1882	83.6	811.0	121
12	Tet Jelema	April 4, 1882	70.4	673.2	129
13	Zuidhockster	March 17, 1882	46.2	446.6	138
14	Ferwerder	Feb. 26, 1882	57.2	539.0	120
15	Bosch 2d	May 2, 1882	50.6	484.0	119
16	Berlikumer 3d	March 23, 1882	70.4	675.4	133
17	Buglumer	March 4, 1882	61.6	594.0	124
18	Ruth	Jan. 25, 1882	68.2	655.6	128
19	Geesje 3d	May 3, 1882	83.6	792.0	140
20	Houkje 2d	March 4, 1882	49.5	457.0	173
21	Ee	Feb. 28, 1882	74.8	712.8	124
22	Elsje 2d	March 5, 1882	63.8	624.8	135
23	Siementje	March 11, 1882	66.3	668.8	144
24	Maid of Deinum 3d	April 2, 1882	74.8	734.8	125
25	Kuiken 3d	March 3, 1882	81.4	748.0	127
26	Poppenhinder 3d	March 1, 1882	67.1	649.0	189
27	Kramer 3d	March 18, 1882	46.2	443.8	171
28	Lux 4th	March 2, 1882	70.4	682.0	177
29	Lady Borch	March 19, 1882	71.5	677.6	158

The average largest daily yield of the 29 cows was 66 pounds; and the average largest yield for 10 days for the 28 (the dam of No. 10 not given), 634.3 pounds. Nos. 3, 11 and 19 are each given a daily record of 83.6. Of these No. 3 has the largest for 10 days; and here is her description in the Catalogue:

No. 3.

LADY SEFFINGA, 2d, bred by W. Seffinga, Marssum, Friesland; calved March 19, 1882; sire, Willem; dam, Lady Seffinga.

Black predominating; shield; white upon the nose, over shoulders and over hips; white belly, legs and lower half of tail. Milk record of dam at six years of age, after dropping this calf, on grass alone, two milkings per day; largest yield, 83.6 lb.; Ten days, 796.4 lb. Ear-mark 126.

Other milk records of imported cows:

Maid of Twisk, 15,960½ lb. in 336 days.

Jacoba Hertog, two years old, 10,430 lb. This cow in 1881 weighed 1120 lb., and gave in 16 days 1185 lb., or 65 lb. more than her live weight.

Cjristij Bleeker, 14,220 lb.

Performance in the United States.—This is of course the point of the deepest interest: not what have they done in North Holland, but what are they doing here? The Holstein Herd-Book, Vol. 5, will help answer this question.

Smith & Powell, Syracuse, N. Y., report 22 cows, of which 13 were milked 365 days; with an aggregate result of 246,927 lb., or an average of 11,223 lb. The largest yield in a single day was 84 lb., and the smallest 34 lb. The largest yield for 30 consecutive days was 2309 lb., and the

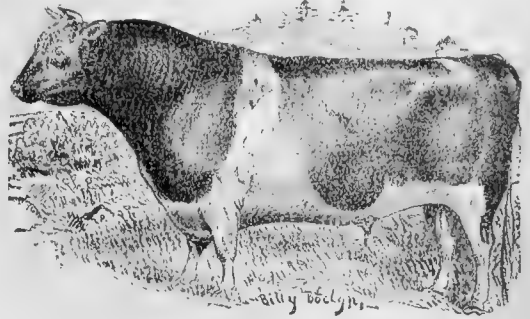
* The "ear-mark" is a small piece of flattened steel wire, stamped with number or name, or both, inserted in the ear as a lady wears her ear-rings.

smallest 931. The oldest cow was 7 years and the youngest 2 years 10 mo. at the end of the year. Cow Jannek, whose average weekly record of milk was about 250 lb., made in one week 19 lb. 15 oz., and in 10 days 28 lb. 3¼ oz.

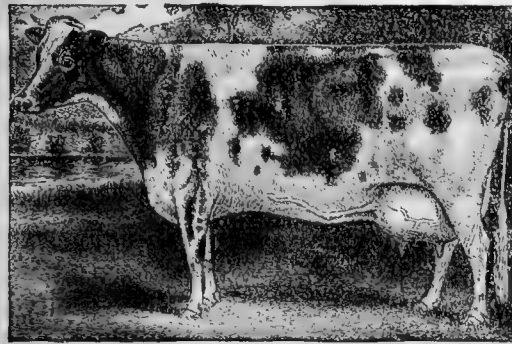
T. C. Maxwell & Bro., Geneva, N. Y., report 17 cows, of which 4 were milked the 365 days, with an aggregate result of 9178+ lb. The largest yield in a single day was 73 lb., and the smallest 29 lb. The largest yield for 30 consecutive days was 2067¼ lb., and the smallest 839. The oldest cow was 6 years and the youngest 2 ye. 7 mo. at the end of the year. Cow Eltona made 17 lb. 14 oz. of butter in 7 days and 35 lb. 3 oz. in 14 days, her milk-yield during the same being from 59 to 63 lb. per day.

T. G. Yeomans and Sons, Walworth, N. Y., report 18 cows, none of which were in milk for a full year, the 18 cows aggregating 1775 days, or an average of a little over 98 days each, the whole record beginning some as early as Jan. 20, and all ending June 14, 1881. The entire yield was 77,643 lb. 10 oz., or an average of 4313+ lb. each for the time. The largest yield in a single day was 78 lb. 12 oz., and the smallest 40 lb. 12 oz. The largest yield for 30 consecutive days was 2130 lb. 8 oz., and the smallest 1067 lb. 11 oz. The oldest cow at the end of record was 8 ye. 6 mo.; 2 ye. 5 mo. Lady Walworth made 19 lb. of butter in 1 week, 37 lb. 6oz. in 2 weeks; Ophelia

Gerrit S. Miller, Peterboro, N. Y.: "Johanna produced 12,264 lb. of milk in 11 months; was milked twice daily, except during a few days in August when, with three milkings she reached 98 lb. per day. Nanny Smit (two years old), during her first 30 days, in milk, gave 1293 lb.; largest yield in one day, 50 lb. During the present season we have given three cows of our herd a month's test, with the following results: On



HOLSTEIN BULL, BILLY BOERLYN, OWNED BY G. S. MILLER, PETERBORO, N. Y.



HOLSTEIN COW, AAGGIE 2D, OWNED BY T. G. YEOMANS & SONS, WALWORTH, N. Y.

(two years) made 13 lb. 5 oz., and Georgie (two years) 12 lb. 2 oz. of butter in a week.

John Mitchell, Meadowbrook Farm, Orange County, N. Y., reports among other cows, Frieda in one day 77 lb.; one month 2232 lb.; six months 10,190 lb.; and in one year 16,076 lb.

Carey R. Smith, Iowa City, Iowa: of the cow Mink: "Her yield is as follows: for ten days, when on trial for butter, 815 lb. of milk, from the cream of which was made 29 lb. 6 oz. of butter; best consecutive ten days, 849 lb. of milk; best daily yield, 91 lb.; monthly yield, 2490¼ lb.; yearly yield, 16,628½ lb."

the 21st day of May, Ondine, No. 828, completed a thirty-one days' trial; total yield of milk, 2545¼ lb.; average per day, 82 lb. 1 oz.; best 10 consecutive days, 847¼ lb.; average per day for best 10 consecutive days, 86 lb. 3 oz. It was during these 6 days that she reached her best daily yield, 90½ lb.; her three milkings on that day were 31, 31 and 29½ lb.; of 27 consecutive milkings, 23 ranged from 28 to 31 lb. each. Her food consisted of long dry hay and a mixture of grain (wheat bran being the largest portion), fed dry in varying quantity; the total amount would be about equal to 18 qts. daily; no slop or liquid, except water, was given. Empress, No. 539 (ten years old, and a cripple, having nearly lost the use of one hind leg from injuries received on shipboard), and Johanna, No. 344, were turned into a lot where the feed was good; they had grain when they would take it; some days they refused it. During the month of August Empress gave 2276½ lb.; largest amount in one day, 81 lb.; average per day, 73½ lb. Johanna was sold during the latter part of the month at her best flow of milk, and the trial ended. During the last 31 days she was in my possession, she gave 2407¼ lb.; average per day, 77¾ lb.; average for last 23 days, 80 lb.; best yield in one day, 88 lb.

"There are now 18 cows (over two years old) in milk in the Kriemhild herd, and the average of the best day's yield of 10 of them is 68 lb."

And Mr. Miller adds it as his "belief that selected cows of this breed will make as much, if not more, butter than those of any other breed."

From sources outside the Herd-Book: Smith and Powell report, in *Breeder's Gazette*, May 10, 1883; Clothilde, three years old, gave in one

year 15,622 lb. 2 oz. Addie, three years old, in 11½ months, 13,521 lb. 2 oz.

Cow Echo, 121.—(For portrait, see page 241.) This cow has furnished the largest year's product of milk yet reported in the United States. She belongs to F. C. Stevens, Esq., Maplewood Stock Farm, Attica, N. Y. Mr. Stevens writes: "On March 11, 1882, she gave birth to a heifer calf, which ran with her until the 20th, when we began to milk her. On the 20th of May she was turned out to pasture. During the season she had the same care as the rest of my stock, and no more. In September she was taken to the Western New York Fair, at Rochester, and was away from home one week. The last week in December, for the first time during the year, I figured up the milk records of my herd; and finding Echo's so large, I thought something might be done with her; so I instructed my men to feed her three pailfuls of bran per day (just double what she had been having since she came from pasture). When in the stable she had fifty-five pounds of corn ensilage, six pounds of hay, or twelve of cut straw, with the amount of bran named. The following is the record by months:

Month.	Yield.		Largest day's yield.	Average.
	lbs.	lbs.		
March.....	592¾	52¼		49 6
April.....	1,433¾	50¾		48 5
May.....	1,533¾	58¾		49 5
June.....	1,988¾	83		66 4
July.....	2,196¾	79		70 12
August.....	1,554	67¾		50 2
September.....	1,406¼	52¾		40 12
October.....	1,455¾	53		46 10
November.....	1,302¾	53		43 8
December.....	1,375¾	46¾		44 5
January.....	1,340¾	45¾		43 4
February.....	1,189¾	40¾		42 2
March.....	752¾	42¾		38 7
Total.....	18,129¾			

"From March 20 until June 5 she was milked twice a day. From June 5 until August 4 she was milked three times a day. The rest of the year only twice a day."

Echo was bred by Mr. Miller, of Peterboro, already referred to, and sold by him as a three-year-old. He also bred and sold Ægis No. 69, who has made a year's record of 16,823 lb. 10 oz.

Milk Sold.—Here is one instance: S. N. Wright, South Elgin, Ill.: "I send you the milk record of my dairy of twenty-seven grade Holstein cows for the year 1882, as follows: 219,900 lb. milk, bringing me net \$2638.80, averaging 8107 lb. of milk per head, netting \$97.73 per head. I endeavor to have my cows go dry at least sixty days, which shows the cows were in milk on an average of 303 days, and that the twenty-seven cows gave me an average of a little over 26½ lb. of milk per day. This milk was taken to the butter and cheese factory, owned and operated

by the Elgin Co-operative Creamery Association. The cows are nearly all of my own raising, using always the best full-blood Holstein bulls I can get, and selecting the best heifer calves."

One Instance of Fattening.—T. B. Wales, Iowa City, Iowa: "I would like to hear of a Short-Horn, Hereford, Polled Angus or any animal of any breed that can equal the gain in weight made by one of my calves, Jaap 4th, 1337, calved Aug. 30, 1882, as per statement below. It is not impossible that this little fellow, when of age, may get away with some of the fat-stock-show sweepstakes premiums. The weighings have been made by disinterested parties who are ready to take oath to their truth. The sire of this calf, Jaap (451), and his dam Tietje 2d (726), were both members of the first-prize herd at St. Louis, last fall. Feb. 9, 1883, weighed 550 lb., March 8 weighed 674 lb.; gain in twenty-seven days, 124 lb.; April 7 weighed 834 lb.; gain in thirty days, 160 lbs. May 8 weighed 954 lb.; gain in thirty-one days, 120 lb. It will be seen that from March 8 to April 7, thirty days, the gain was five and one third pounds per day, and at eight months and nine days he weighed 954 pounds."

Comparisons.—Conrad Wilson made several comparative statements in the article already referred to. He makes the milk-yield of 9 Holsteins 144,137 lb., to which add Echo's 18,120, and we have the milk-yield of 10, 162,257 lb., or an average of 16,225½ lb. Taking the best specimen he can find of the Short-Horns, the Devons, the Ayrshires, the Jerseys, and natives, he gets 56,966 lb., or 11,400 lb. each cow, an average of 482½ below the Holsteins. But when he comes to butter he finds an average of 596½ lb. per cow for 10 Jersey cows; and the highest specimen he can get from each of the same five classes, in which he gives 509 lb. to the Holstein, only brings the average to "473 lb. per cow, being 120 lb. less than the average of 10 Jerseys, and 300 lb. less than the product of the best Jersey," which is 778 lb. for Darling's Eurotas. He gives four daily yields higher than Miller's Ondine 90½ lb. But, as the highest of all is Miller's Empress, 108 lb., and that is not claimed as a record she has made here, but one made in Holland before she was imported, it leaves the head of the class rather misty.

Their Status.—Different breeders and dairymen will continue to differ in opinion; and the Short-Horn, the Hereford, the Ayrshire, the Jersey, the Holstein and others will continue each to be regarded by its friends as the best breed. Certainly the Holsteins are ranking, if not at the head, at least very near it; and there is none likelier to stand in 1900 at the top for work, for beef, for milk and for butter.

The Secretary of the "Holstein Breeders' As-

sociation of America" is Thomas B. Wales, Jr., Iowa City, Iowa; Editor, Gerrit S. Miller, Peterboro, N. Y. For the Dutch Frisian, H. Langworthy, West Edmeston, N. Y., is Corresponding Secretary and Agent; and animals are kept for exhibition and sale by Mr. S. Hoxie, Whites-town, N. Y.

Holstein Points:—

BULLS—HEAD MODERATELY LONG, FINE AND CLEAN-CUT.

Forehead broad between eyes and slightly dishing.....	1
Face tapering, muzzle medium.....	1
Cheek small.....	2
Nostrils prominent and open.....	1
Horns short, moderately fine, curving forward.....	2
Ears fine and moderate in size.....	1
Eyes large, bright and round.....	2
Neck clean-cut at throat, arched, long, strongly set on shoulders, carrying the head on or above a line with the back.....	3
Shoulders broad and flat on top, same height with hips.....	5
Chest very broad, deep and full.....	10
Chine level with shoulder-blades and straight.....	2
Crops full and even with shoulders.....	3
Barrel well rounded, well ribbed up to hips, broad and deep, of good length and deep flank.....	6
Back straight from shoulders to setting on of tail, broad and flat.....	4
Hips broad and flat, level with back.....	3
Rump long, straight, broad and flat, carrying width well back.....	6
Quarters long, straight, deep, with thighs well rounded outside.....	6
Legs short, strong and straight, tapering, fine bone, broad forearm, in position firm and wide apart.....	6
Tail starting at a level with back, tapering, long and fine, heavy switch.....	2
Hide, skin soft, loose, mellow, of medium thickness, and covered with a yellowish dandruff.....	8
Hair soft, fine and velvety.....	4
Escutcheon first-class, first order.....	8
Teats, four well-developed teats, set well apart.....	2
Size, medium to large.....	3
General appearance and symmetry.....	4
Color distinctly black and white.....	0
Perfection.....	100

COWS—HEAD MODERATELY LONG, FINE AND CLEAN-CUT.

Forehead broad between eyes and slightly dishing.....	1
Face tapering, muzzle medium.....	2
Cheek small.....	1
Nostrils prominent.....	1
Horns moderately fine, curving forward.....	2
Ears fine and moderate in size.....	1
Eyes large, full, bright and mild.....	2
Neck clean-cut and fine at throat, rather long, rather slim, well set on shoulders, carrying head on or above the line of back.....	4
Chest broad, full and moderately deep.....	5
Shoulders lower than hips and moderately thick.....	3
Chine level with shoulders and straight.....	1
Crops full and level with shoulders.....	5
Barrel well rounded, well ribbed back, deep, good length, increasing in size towards hips.....	5
Back straight, broad and flat, with distinct depressions between the vertebræ at the junction with chine.....	3
Hips broad and flat, level with back.....	3
Rump long, broad, roomy and nearly level, carrying breadth of hips well back.....	5
Quarters, straight, long, deep, well developed, with thighs full and round outside, but open and roomy for udder.....	3
Legs short, clean, tapering, with fine bone, strong arm, in position firm and wide apart, with feet of medium size, round, solid and deep.....	4

Tail set on level with back, long, slim, tapering, heavy switch.....	2
Hide, skin soft, loose, mellow, of medium thickness, and covered with yellowish dandruff.....	6
Hair soft, fine and velvety.....	3
Escutcheon first-class, first order.....	7
Udder carried high, extending well forward, well up behind, with even quarters, large but not fleshy, covered with soft, short and fine hair.....	14
Teats convenient size, squarely placed and wide apart.....	3
Milk-veins very prominent, great length, branching, terminating in large, clearly defined orifices.....	5
Size, medium to large.....	6
General appearance and symmetry.....	3
Color distinctly black and white in any proportion.....	0

Perfection.....100

In females, before first calf, the fourteen points given to udder are not considered, and perfection is denoted by eighty-six points.

Uncertainty of Records:—There is so apt to be in all reports an element of variance with the real fact! Dr. Johnson actually saw the Cock-lane ghost, although there was no ghost for the doctor to see. On the track under the rules of the National Association, records are not always implicitly accepted. How much less when the checks and guards there maintained, are absent! The writer quoted to an agriculturist a certain record, at which he smiled incredulously, and replied: "Would you bet on a race where the other man drove his horse and held the watch?" But, for all the croakings of pessimists, the rogues are in the minority, and the returns of milk and butter from different animals are in the main reliable, and need discounting as little as the record of any other class of facts. One man will weigh a little more buttermilk and salt with his butter than another.

The "Pastor."—Experience seems to be teaching that the pasturing of cattle, except where land is very cheap and fertile, is too expensive a way of feeding. A herd of fine cattle, dotting a spacious expanse of verdure, each head bent low to earth and cropping succulence to be afterward elaborated into muscle, milk or fat, affords a picturesque sight, one always dear to the artist and the poet. But if, as seems proved, an acre of good land, properly cultivated, will keep two cows in the stable, the stable will win. Every farmer and dairyman has his own theory, and don't care to accept that of another; and the appetites of cattle are not alike or uniform with themselves, any more than the appetites of men and women. The race of lean and ill-favored kine that eat up seven fat ones and then don't show it, will still remain, though careful breeding will reduce their number and their gauntness. The use of Ensilage, which the reader will find treated under Farming, opens a new and promising field, and bids fair to inaugurate results not yet anywhere obtained.

The Naming of Cattle.—Queen Victoria is lately reported as opposing a proposed railroad, because a part of its line must be visible from her chosen retreat. Sometimes it seems as if one must prefer the picturesque to the useful. East and West 23d or 50th Street seem so commonplace by the side of the beautiful names these avenues might have borne; and the mathematical regularity of Philadelphia, useful and convenient as it is, excites a momentary longing for the more natural irregularities of Old New York, Brooklyn and Boston. So in naming animals. Why should a cow which can be auctioned off for more than \$40,000 be called the “8th Duchess of Geneva,” with such a pedigree as is printed on page 244? The Dutch names on page 250, uncouth and hard to pronounce as so many of them are, seem to have an individuality and charm

that the others lack. If the prosaic numbers must go in, they must; but let them be fastened to an attractive surname. How pleasant these names sound and read, from a single week’s sale at Kansas City in April 1883: Waterside Ida, Mirth, Beauty 11th, Nightingale 15th, Carpie, Dorianne, Fermillian, Lochnagar, Barbarian; Remus, Blackthorn, Bluebeard 7th, Falstaff (we hope this bull’s performance may be better than his prototype’s, though his dispositions couldn’t be), Scotch Lassie, Lady Phyllis, Idlewild, etc. etc. One English nobleman famous on the turf—Palmerston, was it?—named his horses from Homer’s Iliad. Do, if you can, select for your cow or your bull a name whose sound and sight shall attract and not repel. Some men would prefer Ondine, with a pound a day less at the pail, to Bungtown 16th, with a pound more.

SWINE.

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Antiquity of the Hog.—The origin of the hog is unknown; yet since early historic time it has been found in a wild state in Asia, Africa and Europe. The hogs of all these countries have a common origin, proved by the fact that they can breed together, and continue to produce fertile offspring, from generation to generation.

Fossil remains of swine found in the tertiary and diluvial deposits of Europe indicate the great antiquity of the species. But whatever their origin may have been, their great fecundity would soon have enabled them to overrun vast territories. Vauban has estimated the product of a single sow, with only six young at a time, in ten generations to be about 6,500,000, of which half a million may be deducted on the score of accidental death.

Varied Importance.—Although the use of swine-flesh was prohibited by the Jews, and the prohibition has been adopted in the Mohammedan law, it constitutes a large part of the food of many nations. Vast quantities of the flesh are consumed in various forms in North America and Europe as pork, fresh or salted, bacon, ham, etc.

Brawn is an esteemed English luxury. The fat of the hog, which is produced in a thick layer under the skin, is an article of commerce, and of various use under the name of lard. The skin of the hog is made into leather, which is particularly esteemed for saddles. The bristles, particularly of the wild boar, are much used for brush-making.

The-First Swine in America were brought by Columbus, who introduced them into Hispaniola in 1493; De Soto next brought them into Florida in 1538; in 1553 and 1608 respectively they were brought by the French into Newfoundland and Canada. The English brought them into Virginia in 1609, and eighteen years afterward their numbers had so increased that the settlement of Jamestown had to be surrounded with palisades to keep them away.

Three Great Swine-producing States.—From 1871 to 1878 the swine of the United States increased from 29,457,500 to 32,362,500 head. In the latter year the three greatest hog-producing States were Illinois, with 3,355,500 head; Ohio, with 2,341,411; and Iowa, with 2,244,800 head. In

that year there were packed in Chicago alone over 4,000,000 head, in 1879 nearly 5,000,000, and in 1880 over 4,500,000.

Magnitude of the Pork Trade.—In the whole Mississippi Valley there were packed in 1877-8, 6,502,446 head of hogs; in 1878-9, 7,475,648 head; and in 1879-80, 6,946,151 head. The average net weight of these hogs was for 1878 over 226 pounds, for 1879 over 217 pounds, and for 1880 213 pounds nearly. Cincinnati and Chicago are the great centers of the pork trade, the latter city being a little ahead of "Porkopolis" in the extent of its business at the present time.

The Hog Second only to the Cow.—Though, relatively speaking, the hog may not be of the same importance to the rural population as it once was, yet, to the humbler classes, the ancient adage, that it was second only to the cow, cannot be regarded as inapplicable. As an object of natural history, it ranks with the pachydermata, or thick-skinned order of the mammalia—the wild boar, wart-hog, and probably also the peccary of South America, being varieties of the same family.

The Common Hog.—The most remarkable characteristic of the common hog is its long roundish snout, furnished with a strong cartilage at the extremity, for the purpose of grubbing in the earth for roots and other kinds of food. The feet are cloven, and each possesses four toes, two of which are large and furnished with stout hoofs, the other two being small, posteriorly situated and scarcely touching the ground. The body is of a cylindrical form, low set, and thinly covered with bristles, which rise into a mane in some of the ancient varieties. The tail is small, short, and in general twisted, and in some breeds is altogether wanting; the ears are either large and pendulous or short and pointed. The jaws of the hog are powerful; and the teeth with which they are furnished are very formidable, particularly in the wild varieties. Swine do not ruminates (chew the cud); and from this and other peculiarities they can feed either on vegetable or animal substances—thus forming a kind of link between the herbivorous and carnivorous classes of animals. They are, in fact, omnivorous, and scarcely any sort of food comes amiss to them.

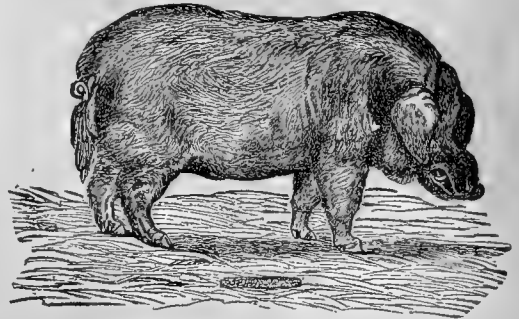
Undeserved Bad Name.—The hog has a reputation which it does not deserve, of peculiar filthiness of habits. It is true that it wallows in the mire, as the other pachydermata also do, to cool itself and to provide itself with a protection against insects, and it searches for food in any puddle; but its sleeping-place is, if possible, kept scrupulously clean. The too common filthiness of pigsties is rather the fault of their owners than of their occupants; and a clean and dry

sleeping-place is of great importance to the profitable keeping of hogs.

Intelligence of the Hog.—The hog is not inferior to other quadrupeds generally in intelligence. It can be easily rendered very tame and familiar. Its acuteness of scent has been turned to account in making it search for truffles; and an instance is on record of a pig having been used as a pointer, in which service it learned to acquit itself extremely well. Instances have occurred of the use of the hog as a beast of draught.

BREEDS OF SWINE.

Chinese.—To the Chinese hogs is due the first improvement in modern swine. Remarkable for prepotency of blood, these hogs were the basis upon which all English and American breeds were founded. But they are generally too fat as pork; and make poor bacon: bred carefully, and mixed with other stocks, they are valuable animals. The infusion of this Chinese blood long since converted the original English



ORIGINAL OLD ENGLISH FIG.

hogs of a hundred years ago—long-nosed, long-legged and raw-boned—into the solid, short-nosed, early maturing hogs of fifty years ago, known as Grass-breed, Irish Graziers, etc.

The India hog was crossed upon these in turn, reducing bone, hair and coarseness of flesh still more. Later the Neapolitan came in, still further refining them, resulting in the splendid Berkshire, Essex, and various black and spotted breeds.

Neapolitan.—This is the most celebrated of the Italian breeds; small, black, with few bristles, short, stout and erect ears, and noted for excellence of flesh, elegant style, little hair and fine bone. Some authorities think that to this breed, as well as to the Chinese, we owe the improvement of all English swine. The first importation of this breed into the United States was made about 1850.

English Breeds.—We have space to mention only a few of the English breeds, first among which is the

Berkshire.—The noteworthy features of this

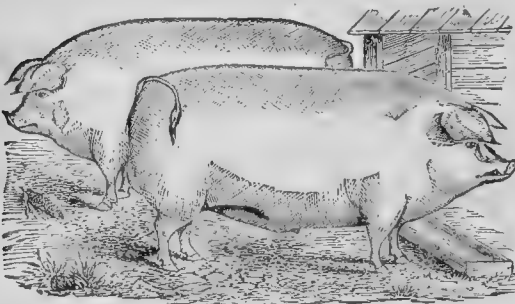
breed are fine bone, great muscularity, firm flesh, and excellent hams and shoulders; they are very hardy, and among the best of the improved breeds as gleaners after fattening cattle. The Berkshire is larger than the Neapolitan, with more bristles, and less fat to the meat, which is well suited for bacon and hams.

Essex.—This is one of the best breeds ever introduced into the United States; in shape and color not unlike the Berkshire, but larger proportionally. They are very vigorous, and the sows are prolific and good nurses. Good to cross on coarse swine, the produce being fine-boned and easily fattened hogs.

Yorkshire.—This is regarded as one of the prime white breeds, hardy, vigorous and well haired, and has been received with great favor in the United States. The large Yorkshire reaches heavy weights, while the middle breed in size and weight is about like the Berkshire.

Other English breeds, not so well known in America, are the *Black Dorset*, much valued locally as being strong-constituted, attaining heavy weights and fattening kindly; the *Suffolk*, a variety of the Yorkshire—they have too much fat, are bad nurses, the pigs are weak, and they are subject to scrofula; the *Lancashire*, a remarkable breed, divided into three sub-families, the short-faced, the middle breed and the large Lancashire, the characteristics and color (pure white) of each being constant.

American Breeds.—The best American breeds are the Chester White, the Poland-China, the Jersey Reds, the Duroc and the Cheshire—all



CHESTER WHITE.

modifications of the Yorkshire, the first two being the most widely known.

The Chester White.—Originated in Chester County, Pa., by Capt. James Jeffries, who in 1818 brought a fine pair of Bedfordshire pigs from England. These being crossed upon the native white hog of the county, their produce with the best specimens attainable, followed by careful breeding and selection for many years, there has resulted the present large, well-formed, kindly fattening variety. Points: head short and broad

between the eyes; ears thin, projecting forward and lopping at the point; neck short and thick; jowl large; body lengthy and deep; back broad; hams full and deep; legs short, and well set under the body for bearing the weight; coat thin, white and straight, or perhaps a little wavy; small tail, and no bristles.

The Poland-China.—This is the favorite breed in the great corn-growing region of the West. The history of this breed has been in controversy, but it seems to be well established that it was originated in Warren County, O., by the Shakers of Union Village, who in 1816 bought a boar and three sows of what was then thought to be pure China. They were called Big China hogs.



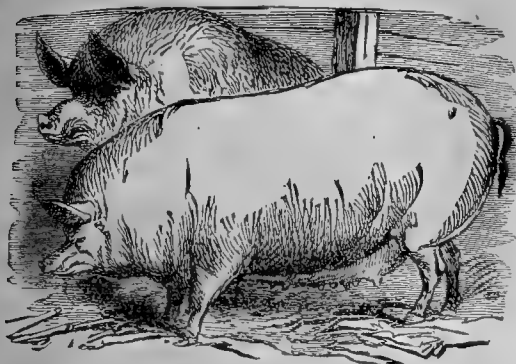
POLAND-CHINA BOAR.

Later other China hogs were purchased. The Shakers and other breeders in Warren and Butler counties continued to cross them with Russian and Byfield blood, producing eventually a hog of fine qualities for that time, and known as the Warren County hog. About 1836 the Berkshires were introduced, crossing with which breed was almost exclusively done till about 1840, when Mr. Wm. Neff, of Cincinnati, imported several choice Irish Graziers. This breed rapidly grew into favor, and was frequently used in making crosses with the best specimens previously had. Points: short legs; broad, straight back; deep sides, flanking well down on the leg; very broad, full, square hams and shoulders; drooping ears; short head, wide between the eyes, of spotted or dark color. They are hardy, vigorous and prolific, and when fat are models, combining the excellences of both large and small breeds.

The Cheshire is only a variety of Yorkshire, originating, it is said, in Jefferson County, N. Y. They are pure white, with little hair and a pink skin, thin and pliable, but uneven; like the Suffolks, the tails of the young often drop off. Snout often long, but slender and fine; jowls plump; ears erect, fine and thin; shoulders wide, and hams full. These hogs are prized for the great quantity of mess-pork in proportion to the amount of offal.

Jersey Red.—These hogs have been bred in some parts of New Jersey for the last fifty years,

where they are highly valued. They attain heavy weights, sometimes reaching 600 pounds; are hardy and strong, free from disease, and said not to be liable to mange. Points: color red, with a moderate snout; large lop-ears; small head; long body, standing high on the legs; bones coarse; hairy tail and brush; hair coarse, inclining to bristle on the back.



IMPROVED CHESHIRE.

The *Durocs* are also a breed of Red swine, common in Saratoga County, N. Y., where they have been known for twenty-five years. They are superior to the Jersey Reds, and reach high weights when mature. Western producers have bred them with satisfaction. The progenitor of both the Jersey Reds and the *Durocs* was evidently the older Berkshire, a sandy hog with more or less black—a common feature of that breed about fifty years ago—and altogether different from the high-bred swine of to-day.

REARING AND KEEPING.

Selection of Breeding Hogs.—The following points are given as deserving the attention of every one about to select breeding hogs:

In the first place, sufficient depth of carcass, and such an elongation of body as will insure a sufficient lateral expansion. Let the loin and breast be broad. The breadth of the former denotes good room for the play of the lungs, and a consequent free and healthy circulation, essential to the thriving or fattening of any animal. The bones should be small and the joints fine; and the legs should be no longer than, when fully fat, would just prevent the animal's belly from trailing upon the ground. The leg is the least profitable portion of the hog, and we therefore require no more of it than is absolutely necessary for the support of the rest. See that the feet be firm and sound; that the toes lie well together, and press straightly upon the ground; as also that the claws are even, upright and healthy. Many say that the form of the head is of little or no consequence, and that a good hog

may have an ugly head, it being no affair of anybody but the animal himself which has to carry it; but the head is one of the very principal points in which pure or impure breeding will be most obviously indicated. A high-bred animal will invariably be found to arrive more speedily at maturity, to take flesh earlier and with greater facility, and altogether to turn out more profitably than one of questionable or impure stock; and such being the case, the head of the hog is by no means a point to be overlooked by the intending purchaser. The description of head most likely to promise, or rather to be the concomitant of, high breeding, is one not carrying heavy bone, not too flat on the forehead or possessing too elongated a snout—indeed, the snout should, on the other hand, be short, and the forehead rather convex, recurving upward; the ear, while pendulous, should also be inclining somewhat forward, and at the same time light and thin. Nor should the buyer pass over even the carriage of a hog. If this be dull, heavy and dejected, it would be safer to reject him, on suspicion of ill-health, if not of some concealed disorder actually existing or just about to break forth. Nor is color to be altogether lost sight of. In the case of hogs, as in reference to any other description of live-stock, those colors are to be preferred which are characteristic of the most esteemed breeds. If the hair be scant, look for black, as denoting connection with the delicate Neapolitan; but if too bare of hair, too intimate alliance with that variety is to be apprehended, and a consequent want of hardihood, that, however unimportant, if pork be the object, renders such animals hazardous speculations as stores, from their extreme susceptibility of cold and consequent liability to disease.

One cannot be too careful in the selection of proper stock to breed from. If the desire is to get early into the market, and to produce pork, the varieties most likely to take on flesh quickest, and come earliest to maturity, should be chosen. If, on the other hand, bacon is the object, the larger breeds are the most suitable. In any case, the boar should be rather less in size than the sow, and more compact and hard in the flesh.

Avoid In-and-in Breeding.—With hogs as with cattle in-and-in breeding is disapproved by most people, as calculated to decrease the size of the progeny and weaken the constitution. Several instances could be pointed to of successful close breeding of this kind among cattle, but few among hogs; so that in the case of the latter, at any rate, it should be, and generally is, studiously avoided. To secure a good strong plant and a vigorous progeny, hogs should not be allowed to breed during the first year of their existence.

The Sow is very prolific, compared with other large-sized quadrupeds, and for that end is provided with from twelve to sixteen teats. Her period of gestation is sixteen weeks; the number of young varies considerably, being frequently below ten, and occasionally rising to twenty. The young pig is exceedingly delicate; and the brood-sow should not be allowed to farrow in winter, but in spring and autumn, when the weather is less severe and food more abundant. Another peril to the litter arises from the semi-carnivorous habits of the mother, which lead her to forget the duties of nature and devour her own brood. She ought, therefore, to be well watched, and fed abundantly at such periods. The male, for the same reason, must be excluded altogether. Not unfrequently, moreover, the young are crushed to death by the mother, in consequence of their nestling unseen below the straw. To prevent this risk, only a small quantity of straw, dry and short, should be placed below them. The young are weaned when six weeks old; and after weaning* it is essentially necessary to feed them with meal and milk, or meal and water, or whey.

Sundry Hints.—Many persons labor under the notion that swine, while breeding, should be kept lean; but nothing can be more erroneous; for, after farrowing, great part of those juices which would be converted into milk, were she in good condition, will naturally go toward nourishing her system. When required for the purpose of fattening, the male young pigs are cut, and the females sometimes spayed, which is an analogous process. These operations should always be intrusted to a farrier or other properly qualified person. At weaning-time it was also customary to “ring” the young pigs; that is, to insert a ring of iron in the cartilage of the nose, to prevent the animal from grubbing and turning up the floor of the piggery. In pigs intended to be turned to the woods or fields this process was especially necessary; and, where requisite, is preferable to the barbarous and less effectual plan of cutting off the cartilage altogether. Though still done to a considerable extent, the ringing is not now so common as it was; the improved construction of piggeries, and the diminution of the herds and droves in woods and fields, rendering it less imperative.

Pig-Houses.—The results which attended the better housing, more careful breeding and higher feeding of pigs in comparatively recent years, have convinced most people that any rickety structure is not sufficient even for the accommodation of swine. For many years, country-people regarded the pig as the dirtiest and least to be cared for, in the way of housing, of all the animals in their possession, and treated it accord-

ingly. Probably few animals are less fastidious about the source from which their food comes, or how it is prepared, than the common pig; but if properly attended to, the natural habits of the pig are more cleanly than was generally supposed. The pig-sty should be preserved in the driest, cleanest possible manner; the food regularly and judiciously supplied; and the skin of the animal curried frequently. The miserably built, open-thatched, imperfectly littered pig-house of old is fortunately of rare occurrence nowadays. Improvements are gradually progressing over the country in the housing and feeding of pigs; and the progress has been accelerated by the fact that, in proportion to its advancement, the mischievous propensities of the animal are diminished.

Improved piggeries on a first-class farm should consist of three kinds—namely, for breeding, for feeding and for weaned pigs. A few months ago, a writer thus described the piggery of Messrs. John Moir and Sons, Garthdee, Aberdeen (Scotland), where about fifteen hundred pigs are kept: “In two large sheds and courts are about two hundred and fifty breeding-sows of various ages, sizes, conditions and breeds. In addition to this accommodation, there are one hundred and four pens or boxes, floored with asphalt and Caithness pavement, heated by steam-pipes, and conveniently arranged in four or five double rows. These pens are used by the young pigs, the boars and the animals undergoing the finishing-touch in feeding. The breeding-stock is fed twice a day, and those preparing for slaughter thrice.” The breeding-sty should be about six feet by eight or nine feet, and the yard in front a little larger. Rather less space may do for the feeding-pigs, if only a pair be intended to feed together. The accommodation for newly weaned pigs should be at least double the size specified above. Swine can scarcely be too much exposed to the sun, in whose rays the animals are fond of basking. Pigs like heat, as is proved by the manner in which they—especially the higher-bred ones—bury themselves among the straw or litter in cold weather. The wooden and paved floors of the piggeries are being to some extent superseded by the introduction of asphalt, which proves satisfactory if litter is fairly plentiful. In the more modern piggeries, as at Garthdee, a perfect system of draining away the liquid manure has been introduced, and also a supply of water for flushing purposes.

An excellent form of *feeding-trough* is now much used. That part of the trough in the inside of the yard is divided with partitions, reaching some distance into the yard, so that each pig can quietly take its meal without being forced

away by a stronger animal, as is often the case in ordinary troughs, where they all feed in common. Another contrivance is also attached, by which the inconvenience occasioned to the attendant in filling the ordinary trough is obviated. Part of the trough being outside the sty, a swing-door or iron plate is suspended on hinges from its upper end; when this is pushed forward toward the yard-side of the trough, and kept in this position by a catch, the pigs cannot obtain entrance; the whole of the trough is therefore exposed to the attendant, so that he can easily place the food without being annoyed by the pigs. When filled, the swing-door is pulled toward the outside, and there kept by the catch, and the pigs have free access to the trough. This form of trough is built in the wall of the sty, and may be used to feed pigs on either side.

A good form of feeding-trough for a yard is the circular one, divided into compartments; these being extended radially for some distance, forming a series of stalls admitting only one pig at a time.

Feeding.—A number of pigs are still allowed to cater the bulk of their food in some rural districts during summer, but not nearly so many as once were herded in this way. The most of the pigs now are kept the whole year in sties, and "hand-fed." To many small farmers the keeping of a pig or two is an important matter; and when a pair of young pigs are purchased, one is sold when ready for the butcher, weighing all the way from 100 to 200 pounds, and the money received for this one defrays the buying-price of the two, and also any outlays for artificial food required beyond the wastes of the holding. The second pig is thus free, and is killed for use in the feeder's family over winter; and highly prized it is by them. Unless for delicate pork, it should not be killed less than a year old. During the summer, the pig may be fed on any refuse from the kitchen or garden, including turnip and potato parings, table-waste, cabbage-leaves, etc; but if barley-dust, or grains from a distillery, can be economically procured, either forms a good article of diet. Let it be kept in remembrance that the finer the feeding, the finer will be the pork.

We quote from an eminent American authority as follows respecting the *Proper Food* of hogs: "Swine do not eat many varieties of herbs and grass, about the only one they will feed on being pig-weed, pursley and various other succulent plants, with the commoner pasture grasses and red and white clover. Artichokes and various other tubers and roots, many insects, frogs, and such small animals as they can kill, along with all the edible grains and vegetables, constitute their natural food." Again: "If they are al-

lowed a fair range on clover, including the gleanings of grain-fields in summer; and if a good supply of pumpkins, and the refuse fruit of the farm, be allowed them in autumn; and if in the winter they be allowed daily rations of artichokes, small potatoes, parsnips or carrots, they may have, in addition, what grain they need to keep them in full flesh—not fat. If this course of feeding were generally adopted for the breeding-stock we should in a few years hear but little of the epidemics which periodically sweep the swine away by thousands."

The food should, at all events, be of a vegetable kind, or principally so; nothing beyond refuse from the table being advisable in the shape of animal food. Whatever be given, let it be offered in small quantities, and frequently, it being a matter of importance never to allow the pig to become violently hungry, nor to have food lying long in the trough. The food should be carefully salted and seasoned; the trough cleaned out before each meal, the diet varied occasionally, and the animals fed separately according to their ages, sizes, conditions and destinations. Breeding-pigs, or those intended for bacon, should not be very highly fed at first. Let the quantity of bran and succulent roots used in the diet be guided by the state of the dung-cast.

Farmers possess considerable advantages for feeding pigs. In folds among young store-cattle, during winter, pigs thrive exceedingly well. They get abundance of heat, lying as often as they can between two or more of the cattle; nor are the cattle any the worse for their porcine companions. The food of the pig kept in this way is scarcely appreciable. Pigs intended for slaughter about Christmas, which is the best time to kill them, should be fed on particularly nourishing material during the autumn. If for pork, the feeding need not be quite so high as for bacon. In any case, let the bulk of the food be of a hard, substantial character, such as oats or meal; for some weeks before killing. Boiled potatoes mixed with a handful or two of meal; the last month or two, are a very common feed at many small farms and produce very fine pork, though not so fat as that raised from such hard food as barley-, bean- or pease-meal. Above all, the half-starving system should be carefully avoided. Repaid as it is by a miserable carcass scarcely worth slaughtering, it is naturally approaching extinction, and cannot reach that goal a day too soon. In fact, there is almost as much oppression occasioned to pigs in these times by excessive as by inadequate feeding. Indeed, many of the huge specimens exhibited at the leading shows appear as if positively suffering from obesity. Not only are they unable to walk, but some of them are quite blind, the eye being

buried in three or four inches of actual fat. Nearly all that is visible of the head are the snout and ears.

If, properly dieted, corn-fed hogs may be turned off weighing 200 to 250 pounds at nine months old; and under ordinary good feeding at ten or eleven months old. It is almost needless to say it is cheaper to feed three pigs to 200 pounds each at nine months old than it is to feed a hog three years to make him weigh 600 pounds; and again, if the pigs are worth six cents a pound alive, it is \$36; the 600-pound hog will not then bring more than five cents a pound, or \$30, and has eaten more corn than the three lighter hogs.

Gleaning in the Fields and after Cattle.—If possible, swine should have the run of grain-fields after harvest. They thus save the grain dropped in harvesting, and, what is better, get a variety of herbage which they could not otherwise obtain. Of course it should not interfere with their getting their usual rations of grain; and plenty of pure water must be provided; for the pig is a very thirsty animal.

Swine should also glean after feeding cattle.

One or two hogs should follow each steer or cow, according to the quantity of grain fed to the hogs in addition.

Field-Feeding will for a long time remain the favorite way of feeding hogs in the great corn-growing area of the West. It is cleanly and economical, and requires only that the hogs be sheltered in cold and stormy weather, and that they have an abundant supply of good water.

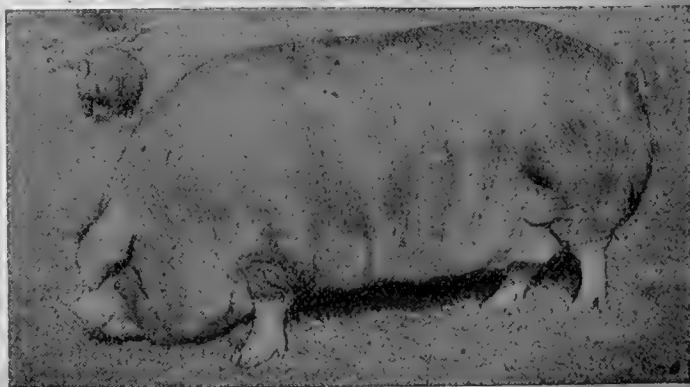
Diseases.—Swine are naturally very healthy animals, and, if at all carefully fed and properly tended, in the domesticated state, not addicted to disease. But if neglected either in feeding or housing, the principal diseases to which they are liable are fever, leprosy, tumors, murrain, measles, foul skin, mange, crackings of the skin, staggers, indigestion or surfeit, lethargy, quinsy, inflammation of the lungs, catarrh and diarrhea.

The only general prescription that can be given—beyond greater attention to cleanliness and warmth in housing, and to the regulation of diet—is to call in the services of a veterinary surgeon.



THE
CHESTERSHIRE
HOG

THE
POLAND-CHINA
HOG



SWINE AND THEIR DISEASES.

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Name is not the first essential in choosing a good hog, but look first to points. One point to think of is, whether the hog will mature early, and has the faculty of taking on flesh. The Berkshire, with perhaps a dash of Chinese and Neapolitan, approaches nearer to the desired standard than any other. The most desirable points which are to be sought for in choosing a hog are as follows:

Depth of carcass and sufficient length of body to insure lateral expansion. Breadth of loin and breast; the former to give good play for the lungs and thereby to insure a healthy circulation. The bones should be small and the joints fine, and the legs no longer when the animal is fatted, than would just keep the body from touching the ground. The shape of the head is of little consequence.

The carriage of the pig is also of importance, for if it is heavy and dejected it is liable to denote ill health, or some internal disorder. Exceptions to this are a fat hog for slaughter, and a sow heavy with young.

The colors which are most desirable are those which characterize the most highly thought of breeds. Black is desirable, being the Neapolitan color. White shows a connection with the Chinese. Light, sandy, or red with black marks denotes the Berkshire.

Treatment During Pregnancy.—The feeding must be well looked after to insure the sows having wholesome food to maintain their strength, but do not allow them to get too fat, as when in that condition the dangers of parturition are enhanced, and the sow is liable to smother her young, and never has as much or as good milk. She must have a separate sty, clean and comfortable, covered with straw. As her time approaches she must be well fed, especially if she is young, to prevent her from eating the after-birth, which produces a morbid appetite and may lead to her eating her young. If once she does this she can never be cured.

Abortion.—This is not common; and if it occurs, is produced from lack of food, eating too much, blows, or rubbing herself against hard bodies. The

symptoms of this are similar to parturition, but more intense, consisting of restlessness, shivering and irritation, cries as of an animal in severe labor pains. At times the rectum, vagina or uterus relaxing, protrudes and becomes inverted at the time of the expulsion of the fetus, being preceded by the placenta. If the symptoms are as far advanced as this, it is too late for any help, and the treatment depends upon circumstances. If abortion takes place and the whole litter is not born, emollient injections may be given; otherwise the treatment should be the same as in parturition, and the sow must be kept quiet, warm and clean. When abortion takes place the fetus is seldom born alive, and frequently has been dead for some days, its presence being detected by a very unpleasant, putrid exhalation and the discharge of fetid liquid from the vagina. These parts should be washed with a diluted solution of chloride of lime. In the preparation, one part of chloride of lime is used to three parts of water, and a part of this liquid injected into the uterus.

Parturition.—The usual period of gestation is about three months, three weeks and three days, and the sow produces from eight to thirteen in a litter. Ten is the largest number which will live to advantage. The approach of the time of farrowing is shown by the enormous size of the belly, by a depression of the back and by the teats becoming distended. The animal shows symptoms of suffering, and gathering together straw carries it to her sty, which should be separated from the rest. The young litter must be taken away as soon as they are born and put in a warm place, or the sow may smother them, and they should not be returned to her until the after-birth has been removed, which should be done as soon as it comes away, or the young pigs may devour it, and if this happens, being all wet with a similar fluid, they may devour each other. Occasionally there are cases of false presentations or of the womb becoming protruded and inverted. If the latter occurs, the womb must be washed in warm water and put back in place.

Treatment while Suckling.—There must be great

care taken at this time, as many sows have been ruined. If the mother is inclined to be feverish she should be given a light, sparing diet of gruel, oatmeal porridge, etc.; and if debilitated, she should be given strong soup, bread steeped in wine or mixed with brandy and sweet spirits of niter. The food must be greatly increased in amount, and should consist of all kinds of roots well boiled, and different kinds of meals. For the first ten days young pigs must be kept by themselves, then allowed to follow the sow. If the sow is not strong, and has not much milk, the young pigs must be taught to feed early. Gruel may be given made of skim-milk and bran or oatmeal; potatoes boiled and mashed in milk. When the pigs are to be weaned the sow must be fed less.

Treatment of Young Pigs.—For the first ten days the sow is usually able to support a litter without help, unless she has too many. At the end of that time the litter should be fed with warm milk. In a week farina may be added, and later on roots and vegetables. When the little pigs begin to run they should have a place fenced in, and their own trough.

Castration.—Pigs are usually castrated with the idea of fattening them; but although it may do so, it usually diminishes their spirits and possibly changes their forms.

This operation must be performed in the spring or autumn when the animal is in perfect health. The age at which this is done is from three weeks to four months old. If the pig is not more than six weeks old there is a cut made in the scrotum, the testicle is pushed out and the cord is cut; but if the animal is older, to prevent hemorrhage, it is better to bind a ligature slightly above the place where the incision is made. Another way of doing this is to cut off a part of the base of the scrotum, forcing out the testicle, and saw the cord through with a blunt instrument. If the animal should be two or three years old he must be held down while the operator takes the scrotum in his left hand and makes one horizontal incision across it, opening both divisions of the bag at once. With the fingers, press out the testicles with a blunt knife, without bruising, then close the wound by pressing the edges together. The cord may be twisted and then gently pulled, until it comes away.

Spaying.—This consists in removing the ovaries, sometimes also a part of the uterus, of the female. The sow is laid upon her left side and an incision made in the flank, and then with the fore-finger of the right hand catch the right ovary, draw it through the opening and put a ligature around it, doing the same with the left ovary. The two ovaries must then be cut and the wound closed with two or three stitches.

The diet must be well looked after and the sty well littered with clean straw. The best age for this operation is about six weeks.

Weaning.—Some wean a pig a few hours after birth, but it is better to wait until it is about six weeks old and then done gradually. The sty must be warm, clean and dry, and the pigs should have the run of a meadow for a few hours every day to prevent them becoming crooked in the legs. When pigs are newly weaned they require five or six meals in the twenty-four hours, and plenty of cold water.

Ringling.—This is to prevent swine from digging up the earth. A ring is passed through the snout bone, and thus the animal is prevented from burrowing.

Feeding and Fattening.—Roots and fruits are natural for the hog to eat, but it is better for the quantity of his flesh and his health to give him the refuse from the dairy farm, with skim-milk.

Pigs are usually fattened for pork, at from six to nine months old; bacon, from one year to two years. The residue of breweries and distilleries is good for producing flesh, but do not give too large a quantity. Acorns and other nuts are very greedily eaten by them; but grain is the most nutritious and fitting food for fattening, creating firmness and delicacy of flesh. Washing with soap and brush every week adds to the good condition of the hog. It is a very good plan to give swine a fine clover pasture to run in, in the spring and summer, also to allow them to run in the orchard to pick up the fruit which falls. The wash of the dairy, to which is added meal, and soured in tubs, is another good food for hogs. Potatoes are the best of all roots for swine; next, parsnips, red-carrots, sugar-beets, mangel-wurzel, ruta-bagas and white turnips. There are a few rules which must be observed:

1. Avoid foul feeding.
2. Add salt in moderate quantities to the food given.
3. Feed regularly.
4. Clean the trough before feeding.
5. Never over-feed.
6. Vary the food.
7. Feed the animals separately: sows with young by themselves, store hogs by themselves, and bacon hogs and porkers also by themselves.
8. Keep the animals clean, warm and dry.

Piggeries.—Above all things a piggery must be clean, airy, large with well-constructed sties. The different classes of swine must be kept by themselves, such as the boars, breeding sows, newly weaned and fattening pigs. The buildings should face the south and be well drained, with good ventilation. Wood is very good building material. The door of the sty should be made to open either inward or outward, and should be hung across from side to side. The troughs should be of stone so that they can be cleaned, and cannot be gnawed by the animals, and so arranged that the pigs do not have access to them between feeding times. A pig should have three places, — one for sleeping, one for eating, and one for evacuation, the last occupying

the lowest level. Fresh water should be kept continually before them and renewed twice daily. Give them as much charcoal twice a week as they will eat, if they are confined in small quarters.

Slaughtering.—When a pig is to be killed he should be kept without food for sixteen hours, and given a little water. First he must be stunned by a blow on the head, then stuck through the brisket in the direction of his heart, and the blood be allowed to drain completely. Next fill a large tub with boiling water and plunge the carcass into it, and remove the hair with the edge of a knife. It is not necessary to scald him while he is yet alive, but let it be done before the body is wholly cold.

Bacon hogs must be singed by covering the body with straw and setting it on fire, then scraping the body all over, taking care not to burn or parch the cuticle. Next remove the entrails. Wash the interior of the body very cleanly with warm water to remove all blood and impurities. Wipe dry with a clean cloth; after this, the carcass should be hung up in a cool place for about twenty hours to set and become firm.

To Cut up the Carcass.—Lay it on the back, cut off the head close behind the ears; the hinder feet below the houghs, so as not to disfigure the hams; then cut the ham from the side by the second joint of the back-bone.

Dress the ham by paring off the skinny part, shaping it with a half-round point, clearing off all the fat. Then cut off the sharp edge along the back-bone, and slice off the first rib next to the shoulder, taking care to cut off the bloody vein, which, if left in, spoils the meat.

Pickling and Curing.—The ordinary method of curing is to pack the pork in clean salt, adding brine when the barrel is full, but it may be done by rubbing salt thoroughly on each side of every piece with a strong leather rubber firmly fixed to the palm of the right hand. Throw the pieces into a heap and sprinkle with salt, occasionally turning until cured. Pack in dry casks and roll so that the salt may come in contact with every part.

Hams and shoulders can be cured in the same way. The following recipe is a good pickle for two hundred pounds:

Fourteen pounds Turks' Highland salt, $\frac{1}{2}$ lb. saltpeter, 2 qts. molasses, with sufficient water to dissolve them. Cook the liquor to the scalding point and skim off all impurities. When cold pour upon the ham.

The hams may stay in this pickle for six or eight weeks, then hang in the smoke-house and smoke from ten to twenty days according to the quantity of smoke. This is a good place to keep hams until wanted, but if removed they must be kept cool and free from flies.

Value of the Carcass.—Every part of the hog is valuable. The fat may be used for lard, it being

better than butter for frying fish, and is used in pastry for the sake of economy. The stearine contains stearic acid, which, when separated, is used for wax candles. The stearine also contains oleine, which is known as lard oil and used for machinery and lamps.

The bones are used for manure or converted into animal charcoal. If lard is to be obtained the animal is skinned, and the adhering fat scraped off. The bristles are used by painters and artists, and for domestic uses. The skin when tanned is tough and used for making pocket-books, and the seats of riding saddles.

Diseases and their Remedies.—Pigs are by nature very obstinate, and it is very difficult to force them to take medicine; hence it is more easy to prevent than to cure disease. Cleanliness and warmth are the great essentials in caring for swine.

Catching the Pig.—Swine are very difficult to handle when sick, kicking, screaming and biting. So this method is given for getting hold of them:

Fasten a double cord to the end of a stick, and beneath the stick let there be a running noose in the cord; tie a piece of bread to the cord and present it to the animal, and when he opens his mouth to seize the bread catch the upper jaw in the noose, run it tight and the animal is fast. In thus catching the pig against his will, be sure that he does not injure himself.

Bleeding.—If it becomes necessary to bleed the pig the best places to do so are the veins on the interior side of the ear, the palate veins running on either side of the mouth, and the brachial vein of the fore leg. A small penknife may be used in all of these instances.

Drenching.—It is best to mix the medicine with the food. If this cannot be done let one man hold the pig's head between his knees while another holds the hinder part, then take hold of the head from above, raise it a little and incline slightly to the right, at the same time spread open the lips on the left side so as to form a hole into which the fluid may be gradually poured.

Catarrh.—This disease is an inflammation of the mucous membrane of the nose, and may be cured by opening medicines, followed by warm bran wash, a warm, dry sty and abstinence from rich grains or stimulating farinaceous foods. Guard against draughts.

Cholera.—Remedies have almost no effect on this disease, therefore prevention is the only thing of use. The symptoms are as follows:

The animal appears to be deprived of all energy, loss of appetite, lying down by himself, occasionally moving about slowly as though uncomfortable internally, eyes have a dull appearance which increases, evacuation almost continuously of a dark color having a fetid odor, extremities cold, abdomen sensitive to pressure, pulse is quickened rather per-

ceptibly, the tongue is furred, evacuation continues until animal expires, which may be in twelve hours or in several days. As a preventive the following may be found valuable:

Flower of sulphur, 6 lbs.; animal charcoal, 1 lb.; sulphate of iron, 6 oz.; cinchona pulverized, 1 lb.; mix well, and give a teaspoonful mixed with a few potato parings and corn meal, three times a day, keeping the animal in a clean, dry place with not many around him.

Cracklings.—Will sometimes appear on the skin of a hog about the roots of the ear, the tail, and at the flanks. Anoint the cracked parts two or three times a day with tar and lard well melted.

Diarrhea.—In the early stages a more binding diet, as corn flour, etc., will suffice; but if acidity is present give some chalk or powdered egg-shells with about half a dram of powdered rhubarb in the food.

Fever.—Symptoms of this are redness of the eyes, dryness and heat of nostrils, lips and skin. Appetite poor and usually with a strong thirst. Bleed as soon as possible and keep the animal well housed. Bread steeped in broth is a good kind of food. Do not let the animal eat too much, and if the bowels are confined give castor and linseed oil in equal quantities added to the bread and broth in the proportion of two to six ounces. The causes are usually bad sties and bad food, also lying in the dung-heap, or on muddy ground. When the animal is thus sick he should be taken apart from the others and placed in a warm spot. Put a stimulating ointment on his chest and administer sorrel. When the symptoms become violent it is best to kill the animal.

Foul Skin.—This will usually yield to a wash of the animal with a solution of chloride of lime.

Inflammation of the Lungs.—This is a disease which it is difficult to cure. It is caused by damp lodging, foul air and bad food. If the lungs become affected the disease may be communicated by means of the atmosphere. The following may be tried:

Shave the hair away from the chest and behind each fore leg; wet the parts with spirits of turpentine, and set on fire, having the animal well secured, with its head raised, and a flannel cloth at hand to extinguish the flame after it has burned long enough to produce slight blisters.

Jaundice.—The symptoms of this disease are yellowness of the whites of the eyes, a similar hue extending to the lips, and sometimes swelling of the under part of the jaw. Bleed freely; diminish the quantity of food, and give an active aperient every second day. Aloes combined with colocynth is perhaps the best aperient.

Leprosy.—This begins with a small tumor in the eye, followed by a general depression of the spirits; languor follows, the animal refuses food, and rapidly

falls away in flesh. Blisters beneath the tongue appear and frequently cover the whole body. The causes of this are uncleanness, want of fresh air and foul feeding. Therefore the first thing to do is to clean out the sty; wash the animal thoroughly with soap and water to which soda has been added. Give him a clean bed, keep him dry and comfortable, let him have exercise and fresh air. Limit the quantity of his food, give bran with wash.

Lethargy.—Symptoms: Stupor, desire to sleep, hanging of the head and redness of the eyes. Is generally caused from the hogs having too large a supply of blood.

Treatment.—Bleed copiously, then give an emetic, reduce the animal's food; after this give a small portion of niter and sulphur in each morning's meal.

Mange.—The symptoms are well known, consisting of scabs and blotches, and if unchecked spread rapidly over the whole body. The cause is usually dirt; and being extremely contagious, such a pig must be at once isolated.

Treatment.—Place the pig in a clean, dry sty with plenty of fresh air and fresh straw, reduce his food in quantity and quality and give boiled or steamed roots with buttermilk. Keep him without food for five or six hours, then give two ounces Epsom salts in warm bran wash. Give after every meal, one teaspoonful of flower of sulphur, and as much niter as will cover a dime. If in fourteen days a cure is not effected give the following: Train oil, 1 pt.; oil of tar, 2 dr.; spirits of turpentine, 2 dr.; naphtha, 1 dr.; with as much flower of sulphur as will form the foregoing into a thick paste. Rub the animal thoroughly with this mixture, and keep him dry and warm, allowing it to remain on his skin for three days. On the fourth day wash him with soft soap and add a small quantity of soda to the water. Dry him and change his bedding, continuing the sulphur and niter. When he is recovering, wash the sty, fumigate it by putting a little chloride of lime in a cup and pouring a small quantity of vitriol upon it.

Measles.—The symptoms are redness of the eyes, foulness of the skin, prostration of the spirits, loss of appetite, and pustules around the throat and purple eruptions on the skin. To treat this, make the animal fast for twenty-four hours, and give a warm drink containing a dram of carbonate of soda and an ounce of bole armenian; cleanse the animal and the sty, and change the bedding; give at each meal thirty grains of flower of sulphur and ten of niter.

Murrain.—This is similar to leprosy in symptoms with the exception of staggering, shortness of breath and a discharge from the eyes and nose. To treat this it is necessary to keep the animal cool and clean; to bleed, purge and limit him in food. Cloves of garlic are recommended.

Quinsy.—Treatment. Shave the hair, and rub with tartar emetic ointment. Hot applications are also useful. When the swellings are ripe, with a sharp knife make a cut the entire length, press out the matter, wash with warm water, and dress the wound with some resinous ointment.

Staggers.— This is caused by rush of blood to the head. Bleed and purge.

Swelling of the Spleen.— The symptom most noticeable of this disease is, that the affected animal leans to one side, cringing as though in internal pain and bending toward the ground. The cause of this is overfeeding. To treat it, clean out the alimentary canal with a powerful aperient. Compel

the animal to fast for four or five hours, after which, give a little broth in which is mixed some Epsom salts. If the disease has continued for some time the animal should be bled and given the following preparation :

Boil the leaves and tops of wormwood and liverwort for six hours, and give about one-half a pint to the dose.

Surfeit.— This is simply indigestion. The symptoms being panting, loss of appetite, swelling of the stomach and sometimes vomiting. This will cure itself if the animal is fed lightly and the food is of a liquid nature.

SHEEP AND THEIR DISEASES.

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General Management of Sheep.— The selection of the breed depends entirely upon the section of the country in which they are intended to be kept, and for the amount of attention which is to be paid to them. The more hearty and vigorous breeds are best adapted to the extremes of climate and scanty pasturage; those of a more delicate nature will serve better and will be found more profitable in temperatures better suited to their natures.

Let a farmer, in making his choice, study the characteristics of each breed, then take into consideration the conditions and circumstances governing his own locality, his object in the enterprise, and let him be governed by his own purpose.

One of the most important phases of raising sheep is the supplying of early lambs to the market, and this is a very profitable enterprise where one's locality is near a city and one has easy access to a market.

Choice of Ram.— It is perhaps unnecessary to say that a ram of any breed should not be used for at least a year and a half, as most people know that he is at his best between the age of three and six. He should be a strong, healthy and robust fellow, with fine form, and should be as perfect for his kind, as possible. The main dependence of a farmer in the breeding of his stock lies in his choice of a ram. The best results can be obtained by securing a

choice animal and by placing a limited number of ewes in the pen with him. It is not at all well to allow the buck to run with the flock, especially if the flock is large; it being far better to keep him away and allow him to run with only a portion at a time. By judicious management in this way, one can obtain three times as much use from him as though he ran with the entire flock all of the time.

Selection of Ewes.— Only the best of ewes should be kept and the old should be yearly thinned out and killed for mutton. Let each person select his best ewe lambs and keep them for breeding purposes, using, when the time comes, only a proper bred buck, and thus a flock may be built up surprisingly fine. No ewe should bring forth her first lamb younger than two years old, and a great many breeders prefer that the ewe should be three years old, as the lambs then will be a great deal stronger, larger and more vigorous. Ewes on the other hand ought not to breed after they are seven years of age, but there are exceptions to this rule.

The Care of Ewes.— A liberal amount of food should be given to the ewes while they have little lambs, as this will greatly increase the rigor and size of their young, and without food, no animal can reach its maximum development. That man who thinks that by not feeding his flock with proper food, or by under-feeding them, that he is making



SHEEP FOLD.

money, is entirely mistaken, but rather than that, he is losing money each and every day; by this we do not wish to have the farmer over-feed his animals, but to give them a sufficient quantity to keep them in first-class condition.

It is always well to see that your sheep receive kind and gentle treatment, and that they become as tame as possible, for those that are not tamed are not as profitable as those that are, and the caring for the former is more arduous. As it is time for the young lambs to make their appearance those animals which are the most forward should be separated from the rest of the flock and put in a warm, dry place, a stable in a cold climate, or in the warmer climates, a shed. In this way it is more easy to take care of them, and they can have more careful attention. For a few days after lambing, the ewe should be fed on roots, which clears the system, thus strengthening her; but after a week or more has passed other food may be given by which they may gain in flesh. Lambs are born in about five months, or practically from one hundred and forty-five to one hundred and sixty-one days, the average being about one hundred and fifty-four days. A great many think that the average is one hundred and forty-eight days.

If a flock is in a cold climate the lambs make their appearance earlier, and care should be given them to prevent them from being chilled.

Yet if the ewe owns the lamb, it will generally get well even under unsuitable conditions in from three to four days. The ewe in most cases laps the lamb dry and things follow in their natural order. However, if the mother refuse to pay this attention to her lamb, it should be carefully cared for by being wiped dry with a piece of old flannel and shown how to get his meals. It often requires a great deal of patience, but as in everything else, time will accomplish it. The udder should not be allowed to be caked, and they should be treated in the same way as cattle, that is, they should be milked.

When there is a deficiency of milk in the case of the ewe, or the mother dies, the lamb may be given to a young heifer just coming into milk, or it can be supplied from the surplus of another ewe. Milk given to a lamb should never be scalded, only slightly warm.

Disowning Lambs.—Sometimes the ewe will disown her offspring, and this is a cause of considerable trouble to the farmer; if this be the case, the lamb and its mother should be put in a dark pen and left by themselves. However, if this does not accomplish the result the lamb should be made to get its food, some one being required to hold the ewe and another person holding the lamb while this is being accomplished. After this has been tried for several times the ewe will in most cases own the lamb.

Young lambs require food often, and should be fed at least from six to eight times during the day.

Rearing a Lamb by Hand.—This is the cause of great trouble and hardly pays in the long run, especially if your flock of sheep is large. Yet, if it is to be done the lamb should be fed from six to eight times a day, and it

should be fed on milk from a cow that has recently had a calf; it may be fed with a spoon, and later on it can be taught to drink from a basin by putting the finger in the mouth and allowing it to suck the finger, and then by placing his head in the basin. The only trouble in this is to know how much to feed the young lamb, as there is as much danger in over-feeding as from under-feeding.

Lambs raised by hand on a farm, generally become the pets of the household.

Resuscitating Chilled Lambs.—When lambs have been in a place that is cold, and have become chilled and stiff and look as though they were dead, they can generally be brought around by the following methods which have been found to be of very great value. The lamb should be put into a tub of warm water, immersing him in it up to his head. The water should be about ninety degrees, if it is warmer than this it would be harmful; then hold the lamb's head with one hand out of the water, and with the other rub the body of the lamb, especially the legs, briskly. In a short time add some hot water, continue rubbing. Continue adding warm water until it moves its legs, puts out its tongue and shows at least some signs of life. When the sign appears, take it immediately from the water and rub it very dry, allowing the water to drain off; then wrap an old flannel around it, place the lamb in a basket and put it in a warm place. As soon as possible, without exposure, give it to the mother again, making sure that it is thoroughly dry and able to stand. If, however, it should appear weak and unable to stand, give it an occasional rubbing on the outside, and a drop of whisky or brandy on the inside in a teaspoonful of new milk.

Docking Lambs.—This appears sometimes to be a very cruel treatment, yet it is essential to the comfort and welfare of the sheep, as a long tail is a source of great filth as well as of great detriment to the flock. Docking should be done the first few weeks of the lamb's life, provided the lambs be strong and healthy; it should not be done however, when the weather is very hot or very cold: in cold, the stumps will not heal well; in warm, the flies will be troublesome. The best manner of doing it is to take the lambs on a dry cold day, and in the morning before the lambs have heated their blood by exercise; let one person hold the lamb, while another does the docking; lay the tail on a plank of wood, let the person that holds the lamb draw the skin as close to the body as possible, then let the operator take a broad thin sharp chisel, place it between the joints about two inches from the body, strike the tail off with one blow. The skin, which the holder has pressed towards the body, thus relaxes and slips over the portion that has been cut, thus forming a covering for it. The cut will soon heal itself.

If, however, the farmer uses a knife instead of a chisel, the tail should be cut upward rather than downward. To aid in healing the wound, and to prevent flies and other insects, some people have used one part of tar to four parts of lard. Turpentine may be used and is thought very fine by some. Care, however, should be taken when the lambs have been docked not to expose them to the cold.

Feeding Lambs.—In feeding lambs it should be remembered as we have before said that they should be well fed whether they are for market or for breeding purposes. The reasons for this are obvious. Those lambs which are to be raised for breeding purposes should run with the mother until about four months old, and should be given rowen hay and fresh water besides the food they get from the mother. When they are about a month old they can be fed with bran, oatmeal and corn meal.

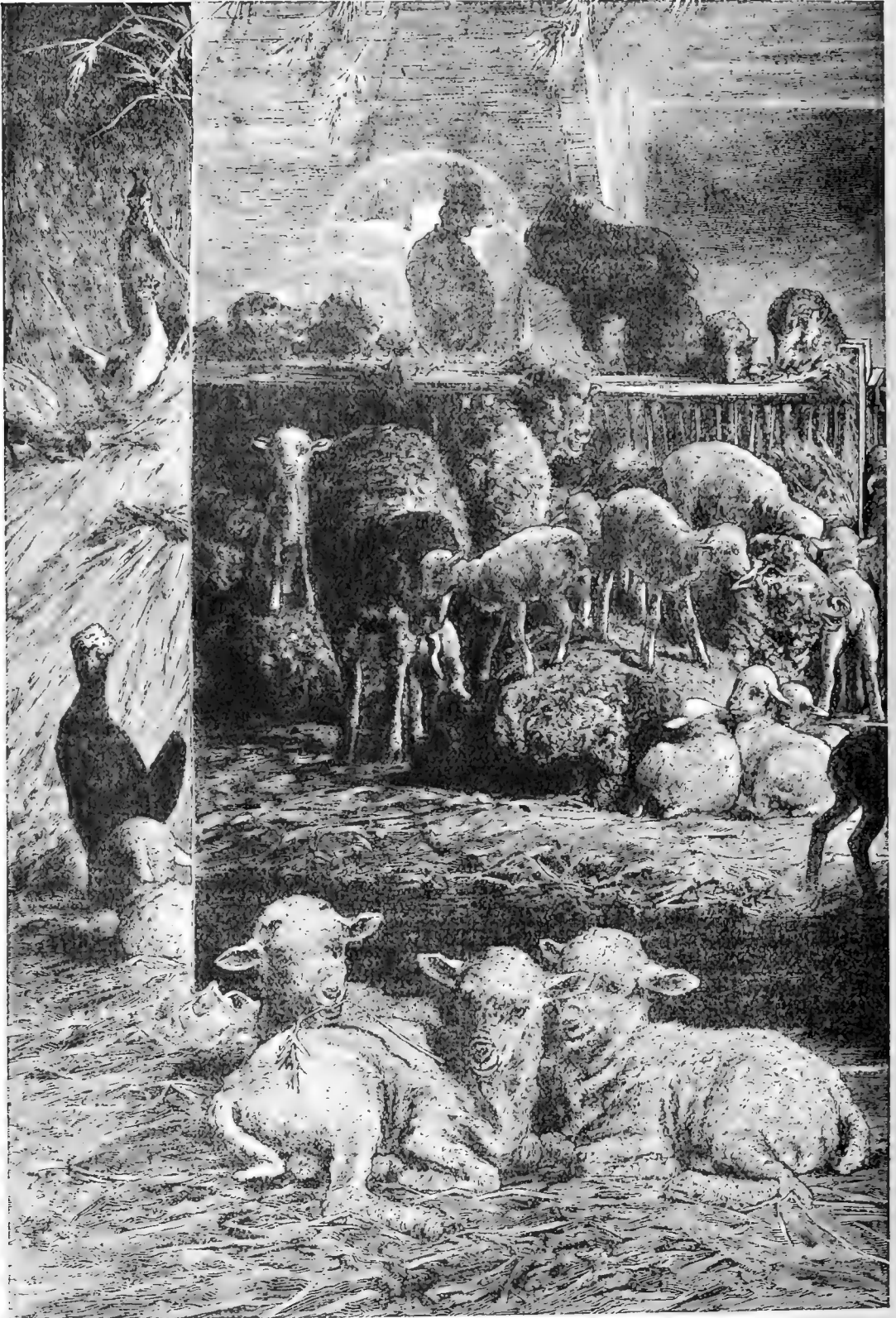
Fattening Lambs.—In fattening lambs, give them from a pint and a half to a quart and a half of meal in addition to the food of the mother. Feeding these lambs should be kept up until they are to be taken to market; in feeding for breeding purposes, the effect of their food is easily seen in the quality and texture of the wool. If the food has been insufficient, the wool will be harsh and lack the oiliness which is seen in well-fed lambs and sheep; and if the food has been irregular, the wool will be varied and liable to break in places.

Weaning Lambs.—Lambs are generally allowed to run with their mother from three to five months, but this period tries upon the vitality of the sheep, and it is better for the lambs to depend upon other food.

It is always well to separate the lambs and the ewes as far as possible from each other so that they may not hear each other's bleatings. The lamb should be fed on more dainty food—better food to make up for the loss of the milk, for a lamb to lose flesh at this period is a very great drawback.

The ewes on the other hand should be fed on dry hay or should be turned into a dry pasture. The reason for this is to check the milk supply. If otherwise treated, that is, fed on juicy food, it is liable to cause inflammation or garget. It is always a good plan to have the sheep milked soon after separation, to avoid danger.

General Management of Sheep.—The sheep when the first cold comes on, should be better cared for and have more nutritious food in order to give them a fair start for the winter season, as when they get into their winter quarters they are apt to decline. When the sheep are heavy and kept fat, the wool grows with great rapidity and the fleeces are very heavy. Do not, in the early part of the season, neglect your sheep; they should be brought into their quarters shortly after the appearance of the cold season.



SHEEP INDUSTRY.

Sufficient room in these quarters, ventilation and such conveniences are all necessary for the welfare and the health of your flock.

A very fine plan is to have separate pens for the different conditions of sheep; those that are strong, in one, and so on, according to their condition of health and strength.

Quarters for Sheep.—The pens should be dry and provided with shelter for a comfortable protection for the sheep when it begins to storm. It is always well to have the pens sloped, to prevent the accumulation of water. A very fine pen and shed is one where the shed is boarded up on three sides with a sliding door, which in case of very severe storms can be closed; this door should be on the south side of the building, and in very sunny weather should be let down.

It is a very good plan to have the floor of this shed covered with straw or sawdust for the cleanliness which it affords. These sheds and pens can be extended along as far as possible, and they should be entered by a door at the rear of the house. It is always necessary to keep salt and tar on hand, as they are excellent for sheep to lick.

It is always well to smear the noses of sheep in the summer with tar to prevent the deposit getting in the nostrils, which may afterwards develop into that much dreaded disease, of nit in the head.

This very infectious disease once killed a fine flock of Shropshire sheep, under the management of F. P. Corliss, of the White Loaf Stock Farm, Southampton, Mass. This was due to a kind of a grass which grew in the pasture at the time; and even afterwards it so prevailed over the whole farm that it was impossible to raise sheep. This disease must be looked out for with great activity, and should be stopped immediately.

In these sheds there should be arranged racks for feeding, and food should never be thrown upon the ground, as it is a waste of good material.

Fences.—Good fences are requisite where sheep are confined, and it is a well-known saying that sheep, more than any other animal, know how to jump fences. Let one sheep lead and the whole flock will follow.

A good fence will save a farmer much annoyance, and he will always find his sheep where he left them. It is always well to have a pasture on a side hill if possible, never allowing your sheep to go into marshy grounds, as this is very bad for their health. If you have a very large pasture it is always advisable to put a fence down through the middle of it and thus have two pastures, putting the sheep in one pasture and then changing them into the other. Many people at night, run their sheep into a fold, as a protection against wolves, dogs and other wild animals. The location of this should be on a sloping ground that it may not become wet and moist, and care should be taken that the fence be

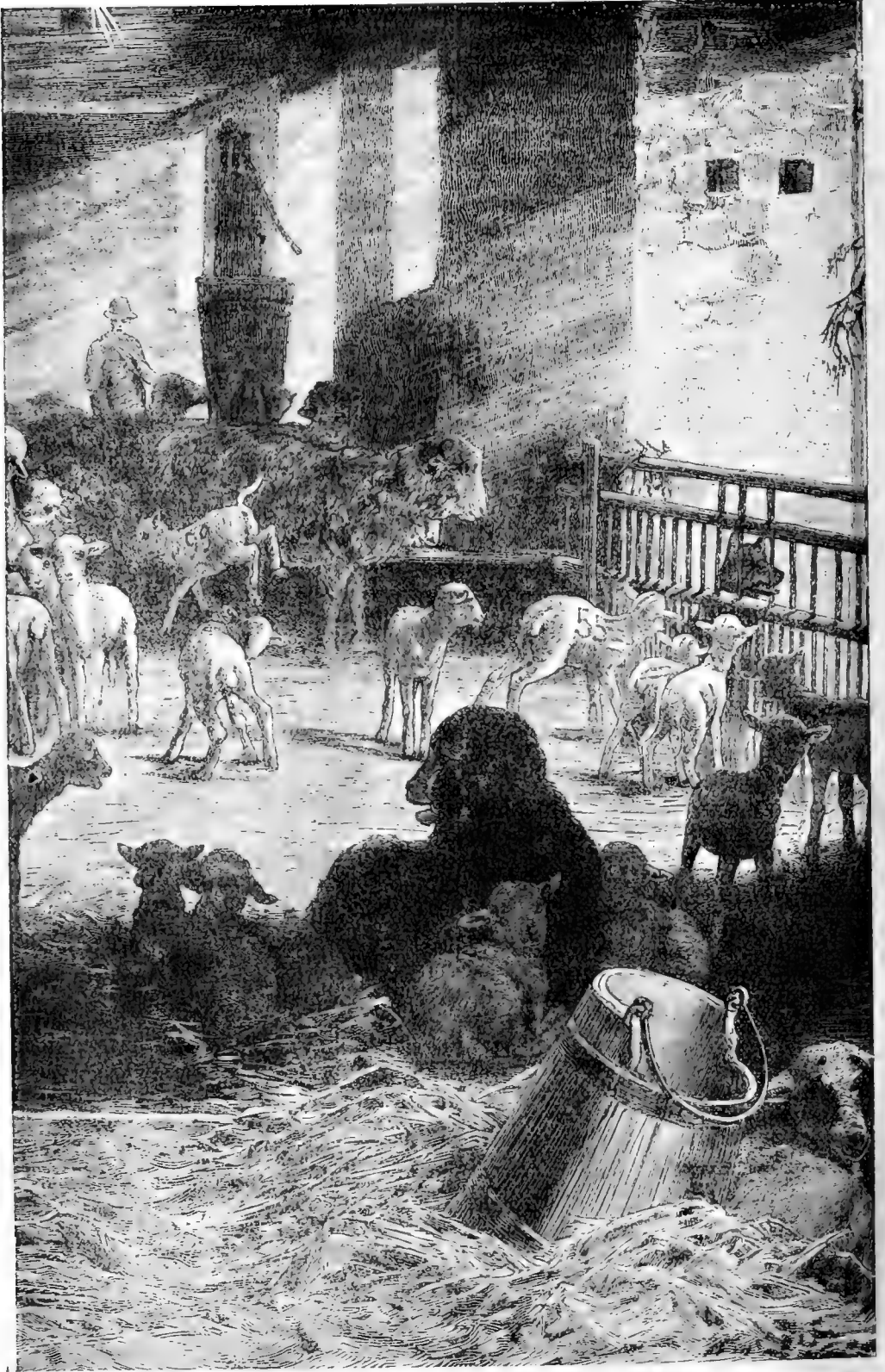
so built that it will even exclude the entrance of a dog. A fancier of sheep once built a pen after this nature; it was made up of four sides, made out of pickets; at the corners there were holes for pins to fit in; he could then put up the four sides and have a sheep pen. This pen at the four corners had four large wheels, about eight inches in diameter, which were so constructed that they could turn in any direction. In this pen he kept his prize ram and two ewes. Each day this pen would be moved in different places around the orchard which was near the house, thus affording a new supply of grass for the sheep and keeping them in fine condition. This is simply a suggestion for some people who care to have some of their stock to show to people coming to see them.

Salt for Sheep.—It is often said by a great many farmers and shepherds that there is no one thing which so contributes to the health of sheep as much as salt. It is known to be one of the very essential ingredients in the sheep's food; where salt is not, the sheep can not and will not thrive; it does away with that injury which has often happened when sheep are turned from dry food to green, at which time the green food ferments in the stomach of the sheep and causes great injury.

The best plan for supplying salt to sheep is to have what they call patent salt-rolls, which are protected from the rain by a covering and at which the sheep can get as much salt as they care to lick. However, should you desire to salt your sheep, be always sure that the supply will fill the demand and that no sheep goes salt-hungry.

Water Supply for Sheep.—It is often said, from lack of knowledge, that sheep do not require a water supply. They, like all other animals, need that supply and should never be without it. That sheep can live in a pasture and not have water cannot be denied; however, they cannot be as healthy nor as strong, and the only pasture in which they can live without water is that where there is very succulent grass, which in itself supplies more or less water.

Shearing the Sheep.—A great deal of carelessness may result in the shearing of sheep, namely, in the cutting of the skin, which will need all summer to heal, leaving the wool in patches; when the farmer wishes to know whether his sheep are shorn or not, let him look at the inside of the fleece to see if there are any short pieces. Damp and chilly weather should always be avoided, and not, as most farmers do, wait for a rainy day before shearing the sheep, as the change from removing the fleece is a very great one. Care should be taken that your animals do not take cold. There are various methods of shearing, each one having his own; but there are a few points which should be noticed, namely, to bring the point of the shears near the skin, keeping the end well away from the body of the



SHEEP AT HOME.

animal and never taking but one cut at the same length of the fiber, for if more than one cut is taken the fiber is injured. Sheep should not be shorn at such a time that they suffer from the cold; when it is delayed for a length of time the burden will become unbearable to them. Do not expose your sheep to the cold or rains after shearing them. The wool from the head and neck is generally separated and should be wound up inside of the fleece.

Tying and Packing Wool.—The manner in which the fleece is tied, has much to do with its sale. The fleece should be as little broken as possible in shearing, and should be free from all filth; it should be put in the exact shape in which it came from the sheep and pressed close together. If the loose wool is to be used, place in the middle, fold each end in, each side one quarter, the neck one corner, and the fleece will then be in an oblong shape some twenty inches wide, and twenty-five or thirty inches long. Then fold it once more and it is ready to be rolled up and tied or placed in the press.

Classes and Grades of Wool.—Wool is divided according to the length of its staple and fineness. We have the coarse wool for carpets and the fine wool for clothing; and the combing clothing wool is divided into three classes, fine, medium and coarse. The finest being used for broadcloth and the finest of woolen goods. Combing wool is used for shawls, worsted alpaca and furniture coverings. The staple is generally four to eight inches long; the coarser the wool, the longer it generally is. The coarse wool is used for carpeting and the manufacture of blankets. Wools are valuable according to their luster and shrinkage.

Sheep Ranches.—One of the first requisites in starting and building up a sheep ranch is to find a good supply of water; it is said that three to five miles should be the length for a sheep ranch. The sheep should be herded only in about two and three hundred to each herd. It is also well not to keep cattle and sheep together.

As a rule the way that the Western sheep herder does, is to get an advance on his money from some commission house, and ship on his wool to be baled and sold at the best market price. Oftentimes the Western ranchmen mortgage the wool on their sheep's back in order to get their money out quickly, and there are a great many buyers going into the Western ranches who buy as much wool as they can ship East and make liberal advances on the same, charging a small per cent commission for selling; thus the Western ranchmen are brought into contact with the Eastern market, and realize a good profit on their wools.

DISEASES OF SHEEP.

As a rule sheep are naturally healthy animals, and except where great negligence has been shown,

diseases seldom gets a foot-hold. It is oftentimes said, that the digestive organs of the sheep are stronger than any other animal that has been domesticated.

Catarrh.—This is sometimes a cold in the head which has been neglected, and it may be caused by becoming chilled and by being left in cold places or drafts. It consists of inflammation of the membrane and oftentimes extends down the lungs, causing lung fever. The best remedy is to take care of such sheep. A good remedy is to smear the nose of your sheep with tar, and care should be given to your flock during the rainy seasons, to keep them in a good dry place. Sulphur one part to five parts of salt is considered a good remedy.

Choking.—Choking is caused by anything getting in the throat; a good preventive is to pour a little oil down the throat. A person can easily with the hand move the obstruction up and down, thus giving relief.

Cotted Wool.—The cause of this is that the sheep are too much exposed to severe weather and storms, being allowed to lie in damp places, and it is also due to imperfect food material. There is a great tendency to scab or skin disease; good food, good pure air and clean water, and dry land to run upon are the only remedies for this.

Colic.—This is, as in the case of horses, very distressing. It is caused by drinking too much cold water when their blood is warm and heated; it is well to give an ounce of Epsom salts dissolved in warm water, and for a lamb one half this dose is a great sufficiency.

Grub in the Head.—Grub in the head is a disease which is very common among sheep; the gad-fly is the cause of this; she lays her eggs about the opening of the nose, and the young grubs make their way up the nostril of the sheep, finally reaching the brain, where they attach themselves by two little hooks coming out of their heads. It is the cause of the death of a great many animals; sometimes they are at least a half an inch long. The sheep oftentimes try to guard against this fly, and some people advise the practice of having a tract house into which the sheep can run, and thus get away from the fly which will not enter a tract house.

Hoof Rot.—This is the most contagious disease that sheep have to contend with; oftentimes it happens that a single sheep affected with this disease has ruined an entire flock. It is a disease of the hoof generally where the hoof unites with the bony structure. Oftentimes the hoof comes off and the sheep die. This disease is caused, as is generally supposed, by an undue amount of dampness and a wet and marshy soil. It is first detected by lameness in the foot, and if attended to directly, can be cured. The first thing to do in such a case is to take them to a dry pasture, the hoof should be pared by a skillful operator using a knife, and if

properly done no bleeding will result therefrom. A solution of arsenic is sometimes recommended, three ounces of arsenic being allowed to a gallon of water, also put in an ounce of salt. It should be put on as warm as the hand can bear.

The theory of this is that the arsenic hardens the hoof, and not only does it act as an antiseptic, but also kills the germ of the disease.

In the applying of this solution it is well to have a long trough for the sheep to put their feet in.

Fermentation of the Stomach.—This is caused by sheep being put into a too rich pasture. The symptoms are, the sheep breathing fast, the body being largely swollen and the sides stick out, especially the

Inflammation of the Eyes.—If the eye seems to be inflamed it is well to see if there is any foreign substance; if so, it should be removed, and then bathe the eyelids with weak salt and water. A little laudanum and sulphate of zinc will in most cases relieve the trouble.

Poisoning.—Often sheep and lambs are poisoned by eating shrubs of a poisonous nature, such as laurel or ivy. When the sheep has been poisoned one might think that it was affected with the colic, on account of the sides being distended; but rather than being active, as in the case of colic, he is dull and stupid, and there will be generally a frothy, greenish substance about the mouth. The usual remedy is



A FINE SPECIMEN.

left side. As soon as fermentation can be stopped in the stomach, relief will immediately follow. Oftentimes driving around the pasture will accomplish this; but the best remedy is to give a teaspoonful of spirits of ammonia in a pint of water, and then follow this soon after with a dose of Epsom salts. If this prove ineffective it is necessary to open the stomach and let the gas out, being careful not to let any of the contents get into the abdominal cavity. If a doctor is not handy, a penknife can be used, inserting a tube which prevents any of the contents of the stomach from getting out; the incision should be made in the stomach half way between the haunch-bone and the last rib near the back-bone.

to give a dose of castor-oil and milk in order to free the stomach as soon as possible.

A stomach pump is a very good thing to use; dilute the poison with a great deal of water.

Scab.—This is caused, like the mange in the dog, by small insects burrowing in the skin and hatching their young there, and unless this burrowing is stopped the death of the animal will follow. It causes itching and pain, the sheep scratches and bites itself, and pulls out his wool, which is only the worse for itself and for others, as in this way it forms sores, and thus the contagion spreads.

Examine the skin in the early stages of the disease; it appears as yellow pimples; the wool gradually falls out and hangs in shreds. This should be

prevented rather than cured; if they have good food, warm dry place in winter, good ventilation, housed in proper conditions, they will be free from this most contagious disease. When, however, the disease appears, let those that are sick be separated from the well ones, and thus prevent contagion. A strong decoction of tobacco steeped in gallons of water until the strength has been extracted. Five or six pounds of tobacco to as many gallons of water should be used; some add a pound of blue vitriol for every pound of tobacco, soft and hard soap.

The sheep should be washed in this, and if the scabs are of a hard nature lard may be used so that they can be easily softened.

Arsenic Bath.—Although it may be very desirable it is never done. Poisoning generally takes place either by the sheep licking one another, or by the sheep drinking out of a pond which is used for the

bath. In bathing the sheep it is always well to let them down into the pond on a board, as they are thus easily handled. However, many recommend that when the disease is only located in one or two animals that it is better to kill them outright rather than to jeopardize the whole flock.

Sore Lips.—The remedy for this is two ounces of glycerine, a half a dram of camphor, one-half dram of alcohol, one-half ounce of flour of sulphur; also a little tar sulphur and lard mixed together is a good salve.

Ticks and Lice.—Ticks and lice cause a great deal of suffering to the sheep as well as making them thin and uneasy. When the sheep are sheared these infesters make their homes upon the lambs. These infesters are cured by washing the sheep and the lambs in a solution of cut plug tobacco and water; the animal should be dipped into this solution.





LEICESTERSHIRE SHEEP

SOUTHDOWN SHEEP



SHEEP AND THEIR VARIETIES

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Early Domestication.—There can be little doubt that sheep were the earliest domesticated animals. Abel, the second son of Adam, was a keeper of sheep, and the pastoral life was the favorite occupation of man in the early ages, agriculture being followed from necessity rather than from choice. The antiquity of their domestication is further proved by their widely diversified character; the Linnæan classification giving the Hornless, Horned, Black-faced, Spanish, Many-horned, African, Guinea, Broad-tailed, Fat-rumped, Bucharian, Long-tailed, Cap-bearded and Eovant. In addition to these are the Siberian sheep of Asia, found also in Corsica and Barbary, and the Cretan sheep of the Grecian Islands, Hungary and some portions of Austria, which are about all the principal sub-species.

Industrial Importance.—Sheep were the chief element of wealth among the Hebrew patriarchs; and the Latin term *pecus* (cattle), whence was derived *pecunia* (wealth), was especially applied to them. In ancient times they were bred mainly for their skins and milk, the latter abundant, agreeable and very nourishing. Now they are prized chiefly for their wool, flesh and fat. Mutton, as is well known, is the most highly nutritious of all flesh meats, and the demand for it is steadily increasing. To supply the markets of New York City alone more than a million sheep per annum are needed. Farmers, hitherto daily consumers of pork, are becoming eaters of mutton, and the convenience of keeping a few sheep merely to supply the family table is appreciated as never before.

Sheep-Husbandry, and Statistics.—In Great Britain the breeding and feeding of sheep has been second in importance only to that of cattle. Since the settlement of Australia and the other British dependencies, the rearing of fine-wooled sheep, however, has been almost entirely abandoned, sheep-raisers confining themselves mainly to the breeding of long-, medium- and short-wooled sheep—valuable as well for mutton as for their fleeces—leaving to the United States and to the British colonies the almost exclusive rearing of fine-wooled sheep—Saxony, Silesian, and French and Spanish Merinos. This production has grown vastly, as these Merinos may be kept in immense flocks, and because, as everybody knows, in Australasia and in Texas, New Mexico, and the great American plains east of the Rocky Mountains, there are vast ranges of country where stock of all kinds may be herded at a minimum cost.

Last year (1882) the sheep of the world were estimated to be 600,000,000 head, yielding 2,000,000,000 pounds of wool annually. Of this number Great Britain had 35,000,000 sheep, shearing 218,000,000 pounds of wool annually. This wool is mainly of long, middle and short staple, but is not *fine* wool. The rough wool, medium fine to coarse, but not uniform in its texture, is produced in South America and Mexico from 58,000,000 sheep, yielding annually 174,000,000 pounds of wool; in North Africa, with 20,000,000 sheep, yielding 45,000,000 pounds; and in Asia, with 175,000,000 sheep, yielding annually 350,000,000 pounds of wool. Now if we add to these numbers 25,000,000 sheep for the mountainous and northern regions of Europe, Greece and Turkey, and 50,000,000 for Russia, producing in all 164,000,000 pounds of wool, the remaining portions of the world may be set down as the home of fine-wooled sheep. Of these Australia has 60,000,000; the United States, 36,000,000; the Cape of Good Hope, 12,000,000; Germany, 29,000,000; Austro-Hungary, 21,000,000; France, 26,000,000; Spain, 22,000,000; Italy, 11,000,000; Portugal, 2,750,000 sheep. Of all these countries, Australia produces the finest wool, while the United States and Canada come next, although Canada is essentially a mutton-producing country, which the United States is not, for the number of sheep kept.

In the United States.—Notwithstanding the vast territory in the United States adapted to sheep-husbandry, the industry has not kept pace with the demand, and until about ten years ago our wool imports were constantly increasing in spite of the yearly increment of our flocks. From 1870 to 1875 only two thirds of our manufactured wool product was home grown. Since that time our annual imports have not increased. The bulk

of imported wool is of low-grade carpet-wools and unwashed Merino, and constituting only one fourth of the product manufactured.

VARIETIES OF THE SHEEP.

The numerous varieties of sheep that now exist in different parts of the globe have all been reduced by Cuvier into four distinct species: 1. *Ovis Ammon*—the Argali. This species is remarkable for its soft reddish hair, a short tail, and a mane under its neck. It inhabits the rocky districts of Barbary and the more elevated parts of Egypt. 2. *Ovis tragelaphus*—the bearded sheep of Africa. 3. *Ovis musmon*—the Musmon of Southern Europe. 4. *Ovis montana*—the Mouflon of America; but this species, which inhabits the Rocky Mountains, is now believed to be identical with the Argali, which frequents the mountains of Central Asia, and the higher plains of Siberia northward to Kamtchatka. This leaves only three distinct species of wild sheep as yet discovered.

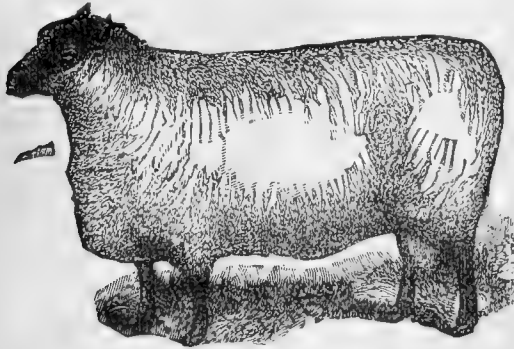
It is still a point in dispute from which of these races our domestic sheep have been derived; nor is the question of great practical importance, though its solution is very desirable in a physiological point of view. Whether the wild races may be regarded as of one species, as some naturalists contend, or of different species, according to others, the best judges are next to unanimous that the domestic races are of one species; and what are called different breeds are nothing more than varieties, the result of different culture, food and climate.

PRINCIPAL BREEDS.

Among the principal breeds reared in Great Britain and the United States are the following: *South-Down Sheep.*—Of this variety the Chicago *Breeder's Gazette* thus speaks:

"Wherever symmetry in outline and perfection in detail are appreciated, the South-Down stands the peer of domestic animals of any breed. With an origin beyond the sweep of history, its merits as a flesh-producing animal have had special recognition for more than a century, during which time it has been so bred within its own blood as to perfect and intensify its best features, while being employed for the improvement of many other types claiming popular favor. Its flesh has long been deemed the synonym of perfection in its line—the ambition of fanciers of other types rarely extending beyond the standard of South-Down mutton. As a meat-producer the South-Down has in its favor all of the recognized requisites: 1. Precocity—its deep chest and rounded rib insuring the fullest play of the vital organs; 2. Prolificacy—flocks wherein the lambs outnumber the ewes being by no means un-

common; 3. Propensity to thrive under average conditions—being ready for market at any time from six weeks old to maturity; 4. Prepotency—its long years of pure breeding having so intensified its characteristics as to insure them pro-

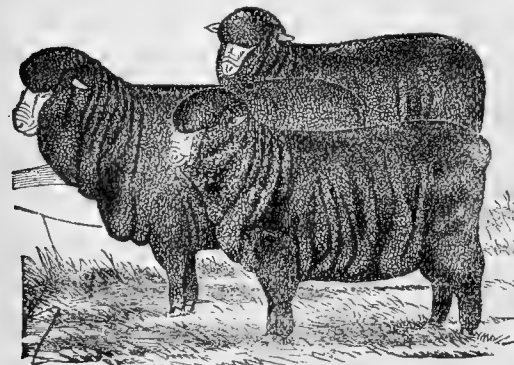


SOUTH-DOWN RAM.

minence when crossed with other breeds; 5. Hardiness—it being found to thrive well under such treatment as the average farmer usually devotes to his stock."

Oxford-, Shropshire- and Hampshire-Downs.—These breeds attain a much larger size than the original South-Downs, and also carry heavier fleeces. It is supposed that this has been attained by a cross of the South-Downs with Lincolnshire or Cotswold blood; be that as it may, they are now acknowledged as separate breeds of great value, combining the finest mutton with a heavy and valuable fleece; but certainly the Shropshire- and Hampshire-Downs are deficient in form. The cultivation of the Oxford-Downs, in particular, is rapidly spreading, and likely to extend in all low-lying districts where pure flocks are raised simply for the butcher-market.

American Merinos.—To quote again from the *Breeder's Gazette*: "Probably three fourths of the now nearly fifty million sheep in the United



GROUP OF AMERICAN MERINOS.

States have a certain proportion of Merino blood in their veins. For eighty years the importations

of Spanish Merinos made between 1800 and 1812 have had especial interest for American breeders, who found in the improvement of fleece and carcass opportunity for displaying their highest skill in breeding and management. Their success in these respects has been such that the typical American Merino—(properly called American, because it is as distinct from the type of its Spanish progenitor, and as fixed in its characteristics, as the French, or Saxony, or Australian types)—possesses every needed requisite for a profitable flocking sheep. Where so many eminent breeders have achieved successes, when so many localities are justly noted for the excellence of their flocks, the day has gone by for any man or any State to consistently claim pre-eminence in the superiority of its flocks. Money and enterprise have scattered flocks from the Eastern States, where the importations of fourscore years ago were cradled and brought into general prominence, until to-day animals of the highest individual excellence are to be found West and South, as well as East."

There are three families of American Merinos—the Atwood, the Rich and the Hammond.

The Merinos are not so much prized for their flesh as for their wool, which has a fineness and felting quality not found in other breeds, and weighs heavier. Shearing is a yearly operation, and eating is final. The sheep that shears advantageously is, therefore, the most profitable, and in that respect, there is not a question as to the claims of the Merino.

Cotswolds.—This breed has been long raised on the Cotswold Hills in Gloucestershire, and is abundant in the fertile valleys of South Wales. It possesses long open wool, and is among the largest sheep in the United Kingdom. Of all English breeds it is the variety most widely disseminated in the United States. It is hardy and moderately early in maturing; strong in constitution; broad-chested; round-barreled; straight-backed; and fattens kindly at thirteen to fifteen months old to yield 15 pounds of mutton per quarter. The wool is rather strong and coarse, but white and mellow, 6 to 8 inches in length, and averaging 7 to 8 pounds per fleece: some American fleeces have been sheared weighing 18 pounds. It is valued for its mutton, the lean meat being large in proportion to the fat. It is used to some extent in crossing ewes of smaller breeds, for raising feeding-stock or lambs for the butcher.

The Devonshire Notts, Romney Marsh, Old Lincolnshire, Teeswater and Old Leicester Sheep.—There are two varieties of the Devonshire Notts: one is called the *Dun-faced Notts*, from the color of the face; this is a coarse animal, with flat ribs and crooked back, but it yields a fleece weighing 10 pounds, and when fat weighs 22 pounds per

quarter, when only thirty months old. The second variety is called the *Bampton Notts*; it resembles the former in many respects, but is easier fed, yields less wool, and has the face and legs white.

The *Romney Marsh* breeds are very large animals, with white faces and legs, and yield a heavy fleece, the quality good of its kind. Their general structure is defective, the chest being narrow and the extremities coarse. The result of their being crossed by the *New Leicester* is still a point in dispute—one party alleging that, though the quantity of wool has been lessened and the size of the animal diminished by the cross, the tendency to fatten and the general form have been much improved. On the other hand, some well-informed breeders contend that, besides the loss of the quantity and quality of the wool, the constitution of the animal is rendered less fitted to the cold and marshy pastures on which it feeds.

The *Old Lincolnshire* breed are large, coarse, ill-shaped, slow feeders, and yield indifferent mutton, but a fleece of very heavy long wool. The *Teeswater* breed were originally derived from the preceding, and pastured on the rich lands in the valley of the Tees, from which they derive their name; but Professor Low remarks that "it is entirely changed by crossing with the Dishly breed, and that the old unimproved race of the Tees is now scarcely to be found." They are very large, and attain a greater weight than almost any other breed—the two-year-old wethers weighing from 25, to 30 pounds per quarter, and yielding a long and heavy fleece.

The *Old Leicester* is a variety of the coarse, long-wooled breeds. On rich pastures they feed to a great weight; but being regarded as slow feeders, their general character has either been changed by crossing, or altogether abandoned for more improved varieties.

The New or Border Leicester.—Mr. Bakewell of Dishly, in the county of Leicester, has the honor of forming this most important breed of sheep. He turned his attention to improving the form of feeding animals about the year 1755. The exact method he followed in forming his breed of sheep is not accurately known, as he is said to have observed a prudent reserve on the subject. But we now know that there is but one way of correcting the defective form of an animal—namely, by breeding for a course of years from animals of the most perfect form, till the defects are removed, and the properties sought for obtained. Though the Border Leicesters have been bred from the New or English Leicesters, their forms and chief characteristics are now widely different, and they are frequently classed as a distinct breed. Forty years ago, the ewes of some of the

present flocks of Border Leicesters in Scotland were then composed of English blood, and rams from Mr. Buckley of Normantonhill, Leicesters, and others were regularly purchased to maintain the desired purity of blood. At that time purchasers of rams for crossing began to give larger prices for sheep of greater size and bone than those lately imported from the south. There can be little doubt this increased size and activity were merely produced by the more extended fields and cooler climate of Scotland; while the stock was still fed on pasturage rich enough to keep them in high condition. The great properties for the farmer of the Border Leicesters, as they are now called, are their early maturity and disposition to fatten. They are also of a most productive nature, three fourths of a flock have frequently twins, and triplets are common. They have long open and spiral wool; ordinary fleeces weigh about eight pounds, but ram fleeces often reach double that weight.

Rocky Mountain Sheep.—All the wild sheep known are natives of mountainous districts, and are gregarious. The Rocky Mountain sheep, called also Big Horn, is famous for its enormous horns, good quality of meat, and fine wool with



ROCKY MOUNTAIN SHEEP.

here and there, however, long overlapping hairs. None of the domesticated breeds can be traced to this variety, but it would, no doubt, readily cross with any of them.

The Moorland Sheep of Devonshire—sometimes termed the Exmoor and Dartmoor—have horns, with legs and face white, wool long, with hardy constitution, and are said to be well adapted to the wet lands which they occupy. Their wool weighs about four pounds the fleece; but they are rather small, and in some respects ill-formed.

The Cheviot breed, deriving their name from the Cheviot Hills, are longer and heavier than the Black-faced. Their wool is fine and close; a medium fleece weighs about three pounds and a half to four pounds; a carcass, when fat, weighs from 16 to 18 pounds and upward per quarter.

Their faces are white; their legs are long, clean and small-boned, and clad with wool to the hough. Their only defect of form is a want of depth in the chest; yet, with this exception, their size, general shape, hardy constitution and fine wool are a combination of qualities in which, as a breed for mountain pasturage, they are yet unrivaled in Scotland, though they require a larger proportion of grass to heather than

The *Black-faced Heath breed*, which, being the most hardy and active of all domesticated sheep, are the proper inhabitants of every country abounding in elevated heathy mountains. They have spiral horns, their legs and faces are black, with a short, firm and compact body; their wool is coarse, weighing from three to four pounds per fleece; but the improved breed, which is of mixed black and white in the face and legs, yields a finer, and a whiter wool. They fatten readily on good pastures, and yield the most delicious mutton; the wedder flocks, when three



BLACK-FACED EWE AND RAM.

years old, are generally fattened on turnips in arable districts, and weigh from 16 to 20 pounds per quarter. They exist in large numbers in the more elevated mountains of Yorkshire, Cumberland, Westmoreland, Argyleshire, and in all the higher districts of Scotland where heather is abundant. Recent severe winters have led to their re-introduction in high grounds where they had for a time been supplanted by the Cheviot and other varieties.

This breed, though not acclimatized in the United States, is thought by some authorities to be admirably adapted to our exposed mountain localities or our unsheltered plains.

The *Shetland Sheep* inhabit those islands from which they derive their name, and extend to the Faröe Islands and the Hebrides. In general they have no horns. The finest fabrics are made of their wool, which resembles a fine fur. This wool is mixed with a species of coarse hair, which forms a covering for the animal when the fleece proper falls off. A similar variety is

known to inhabit the most northerly parts of Europe, from which it is supposed the fine-wooled sheep of the northern islands of Great Britain and the Highlands of Scotland have been derived. They are hardy in constitution, and well adapted to the soil and scanty pastures on which they are reared, but would ill repay their cultivation in lowland districts.

REARING AND KEEPING.

Rutting.—The “rutting” is from September till the middle of December, according to the variety of sheep and the system of feeding. White-faced modern breeds have the tups early among them, and the hill flocks are later. The period of gestation is from 20 to 21 weeks.

Lambing Time.—Ewes occupying sown or low-ground pastures lamb in March, while those not so well provided for—the mountain sheep—do not drop their lambs usually till April. The ancient breeds generally have only one lamb in a season, but modern highly fed varieties frequently have twins, occasionally triplets, but rarely more. Lambs intended to come early into the market are as often as possible dropped in January.

Weaning Lambs.—Generally lambs are weaned in July and August. Weaning of breeding or store lambs, however, is a feature of modern sheep-farming; at one time it was not uncommon to see several generations persistently following the parent stem.

Pasture Suitable for Sheep.—The land best suited for sheep is one that is naturally drained, with a sandy loam or gravelly soil and subsoil, and which bears spontaneously short, fine herbage, mixed with white clover. It should be rolling, and may be hilly in character rather than flat and level. Low spots or hollows in which marsh plants grow are very objectionable and should be thoroughly drained. One such spot upon an otherwise good farm may infect a flock with deadly disease. No domestic animal is more readily affected by adverse circumstances than the sheep, and none has less spirit or power to resist them. It is by long experience that shepherds have learned that the first requisite for success in the rearing of sheep is the choice of a farm upon which their flocks will enjoy perfect health, and that dryness of soil and of air is the first necessity for their well-being. By a careful and judicious choice in this respect most of the ills to which sheep are subject are avoided.

The nature of the soil upon which sheep are pastured has great influence in modifying the character of the sheep. Upon the kind of soil depends the quality of the herbage upon which the flock feeds. Soils consisting of decomposed granite or feldspar, and which are rich

in potash, are unfavorable for sheep. Even turnips raised on such lands, sometimes affect the sheep injuriously, producing disease under which they waste away, become watery about the eyes, fall in about the flanks, and assume a generally unhealthy appearance. Upon removal to a limestone or a dry sandstone soil, sheep thus affected improve at once and rapidly recover. The lambs are most easily affected, and many are yearly lost by early death upon lands of an unfavorable character. As a rule, lands upon which granite, feldspathic or micaceous rocks intrude, or whose soils are derived from the degradation of such rocks, should be avoided. Such soils are, however, not without their uses, for they are excellently adapted to the dairy. The soils most to be preferred are sandstone and limestone lands, of a free, dry, porous character, upon which the finer grasses flourish. The soils which are derived from rocks called carboniferous, which accompany coal-deposits or are found in the regions in which coal is mined, are those upon which sheep have been bred with the most success.

Fondness of Sheep for Weeds.—Sheep eat a variety of vegetation other than the true grasses. They are fond of many weeds, and if allowed will soon reduce the weeds that spring up after harvest. All the pasture grasses are natural to sheep, except those which close feeding is apt to kill. Blue grass, orchard grass, the fescues, red-top, rye grass, etc., may be the main dependence for sheep; clovers they do not like so well. In pasturing ewes with lambs it is well to have spaces through which the lambs can pass, and yet which will not permit the egress of the ewes. In England, these are called lamb-creeps; this arrangement often enables the lambs to get much succulent food outside, and they do no damage to crops. In fact, sheep are often turned into corn-fields and other hoed crops, late in the season, to eat the weeds. They will soon clean a crop if it be such as they will not damage.

Water.—It has been said that sheep require no water when pasturing. But that is absurd. On very succulent grass they will live without it, and, as a rule, take but little. Like any other animal, sometimes their systems require more than at others. This is especially true during suckling time. See that they have it, and of pure quality. Sheep should never drink from stagnant pools.

Protection from Insects.—In summer sheep should have shelter where they may escape from the insects that torment them, especially the gadfly, and others producing internal parasites; also, during July and August, provide a plowed surface of mellow soil, and smear their noses, when necessary, with tar.

Early and Late Pastures.—The better your early and late pastures are, the easier you can winter your sheep, especially in the West, where few roots are raised. Attend to this, and supplement the pastures by sowing rye and other hardy cereal grains, which may be done on corn land of the same season, at the last plowing, and upon grain land intended for hoed crops, next season. Light grain of little worth will prove very valuable in this way if sown as directed.

Never allow your sheep to fall away in flesh before they are put into the feeding yards and barns for the winter. The time to feed is before they begin to lose flesh. They will, of course, shrink somewhat in weight as the feed becomes dry, but if properly fed it will be chiefly moisture that they lose. When the full succulence of the flesh is to be kept up, there is nothing better than roots—Swedish turnips, beets and carrots being the most profitable in the West. At any rate, as the pastures become dry, let the sheep have one feed a day of something better than they can pick up in the fields.

Winter Feeding.—You cannot have an even texture of wool if sheep are allowed to fall away greatly in flesh. Nor can heavy fleeces be raised on hay. If you do not intend to take the best of care of sheep, and keep them thriving, you had better not keep any, but the commonest kinds.

Roots are essential to the best care of sheep. Carrots are excellent for ewes before lambing time, and parsnips for those giving milk; the latter may be left all winter in the ground and be fed up to the time grass becomes flush. Beets should not be fed until after January, on account of an acrid principle they contain when first pitted. They are best when used after the Swedes are exhausted.

Marking Sheep.—To mark sheep without injury to the wool or to the animal, take $\frac{1}{2}$ pint linseed oil, 2 ounces litharge and 1 ounce lampblack; boil all together. Apply the mixture when needed.

SHEARING.

Previous to shearing, all the sheep should be collected and washed, to rid the fleece of impurities. After being washed they ought to be driven to a clean pasture field, and there remain three or four days before they are clipped. Before commencing the shearing of sheep, they ought to be carefully examined, to ascertain whether or not they are really ready for being shorn. Few greater errors can be committed in the management of stock than that of too early clipping. The practice is highly injurious both to fat and lean stock, and not only retards their improvement, but not unfrequently originates organic disease, both acute and chronic.

It is important that the shearing be properly done, and no unskillful person should be allowed to use the shears. May is the usual time for shearing in the Northern States. The tools are a pair of shears and a shearing-bench. The common shears with a thumb-piece upon one side, and an easy spring, is the best tool for the shearer. The shears should be brought to a fine, sharp edge upon a fine oil-stone. The bevel of the cutting edge should be somewhat more than that of a common pair of scissors and less than that of a plane-iron.

The floor of the shearing-room should be kept free from straw, chaff or litter; and if a boy be kept at work removing dirt, tags and rubbish, his time will be well employed. In shearing, the shearer catches the sheep by the left hind leg, backs it toward the bench and rolls it over upon it. He then sets the sheep on its rump, and standing with his left foot upon the bench, lays the sheep's neck across his left knee, with its right side against his body. The two fore legs are then taken under the left arm, and the fleece is opened up and down along the center of the belly by small short clips with the shears. The left side of the belly and brisket are then sheared. The tags are clipped from the inside of the hind legs and about the breech, and thrown upon the floor. They should be swept up at once and gathered into a basket, and not allowed to mingle with the fleece-wool. The breech is then shorn as far as can be reached. The wool from the point of the shoulder is then clipped as far as the butt of the ear. The wool is shorn around the carcass and neck to the fore-top, proceeding down the side, taking the foreleg and going as far over the back as possible, which will be two or three inches past the back-bone. When the joint of the thigh (the *stifle*) is reached, the shears are inserted at the inside of the hough; and the wool shorn around the leg back to the thigh-joint. The wool over the rump is then shorn past the tail.

The sheep being now completely shorn on one side, and two or three inches over on the other side, along the back from neck to tail, is then taken by the left hind leg, and swung around with the back to the shearer, leaving some wool beneath the left hip, which will ease the position of the animal and keep it more quiet. The wool is then shorn from the head and neck down the right side, taking the legs and brisket on the way. The fleece is now

separated. The job is completed by clipping the tags and loose locks from the legs.

When the sheep's skin has been unavoidably cut in shearing, each cut should be smeared with tar, which will prevent flesh flies from depositing their eggs in the wound, and probably avoid after-trouble.

Tying the Wool.—The fleece should be as little broken as possible in shearing. It should be gathered up carefully, placed on a smooth table, with the inside ends down, put into the exact shape in which it came from the sheep, and pressed close together. If there are dung-balls, they should be removed. Fold in each side one quarter, next the neck and breech one quarter, and the fleece will then be in an oblong square form, some twenty inches wide and twenty-five or thirty inches long. Then fold it once more lengthwise, and it is ready to be rolled up and tied or placed in the press.

DISEASES OF SHEEP.

Diseases in sheep are not numerous, in comparison with the maladies of other domestic animals, but they are severe; one of the worst being

Scab, a kind of itch, arising from an insect in the skin, and peculiarly destructive. The diseased animal seeks to relieve itself of an intolerable itching by rubbing against every projection; and wherever it rubs, the icarus remains to carry the infection through the flock. Sometimes a malicious sheep-owner will let a scabby sheep run at large over ground occupied by a neighbor, and the consequences may be ruinous.

Treatment.—Take sulphur, 2 ounces; powdered sassafras, 1 ounce; honey sufficient to make a paste. Dose, a tablespoonful every morning. If a few doses do not remove the trouble, take 4 ounces fir balsam and 1 ounce sulphur, mix thoroughly, and anoint the sores daily.

Foot-rot customarily makes its appearance in flocks ill cared for—allowed to graze on poorly drained lands. The sheep suffer greatly, and fall into poor condition otherwise. A good shepherd knows the consequences that must, in a majority of cases, follow perseverance in feeding over ill-drained meadow or swamp: but sometimes that cannot be avoided.

Treatment.—Remove to better conditions as soon as possible, and apply to the affected feet a preparation of tobacco, which tones up the diseased members. Foot-rot will always yield to treatment if taken in time.

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The word Poultry—derived from the French *poule*, hen—is a collective name for domestic fowl bred or fed for human food and for the eggs and feathers. In a more recent sense, however, the term is specially applied to

BARN-YARD FOWLS,

to a description of the commoner breeds of which we shall mainly confine ourselves in this article.

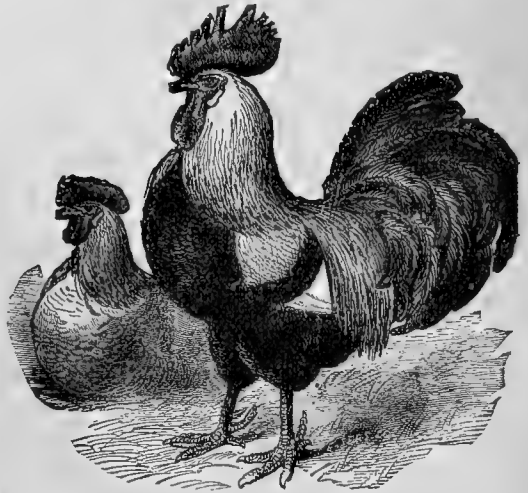
Native Country of Barn-yard Fowls.—The originals of the various species of barn-yard fowls were first found in thickets and other openings of forests, but not in the dense forest itself. The Sonnerat fowl, a native of the Ghautes, separating Malabar from Coromandel, is a variety having a close resemblance to our common barn-yard fowl. Wild fowls much like our old barn-yard fowls were found by Damphier, previous to the discovery of Sonnerat, in the islands of the Indian Archipelago. Hence it may be confidently asserted that our fowls with long flowing tails are natives of India.

Modifications due to Breeding.—The wild species of Southern Asia and of the Malay Peninsula and Chittagong were, there can be little doubt, influential in modifying the large Asiatic breeds of the present time; and our bantams very likely spring from the Bankiva jungle-fowl, although judicious breeding and careful selection have produced bantams of nearly all the breeds of barn-yard fowls, including the Games. We may classify our fowls, then, into the common or mixed breeds, Asiatic fowls, European and American varieties, and bantams. We will describe some of the popular breeds, beginning with the

Dorkings.—These are preëminently English fowls, and general favorites, especially with lady fanciers, not only for the great beauty of all the varieties, but even more perhaps for their unrivaled qualities as table-birds—a point in which ladies may be easily supposed to feel a peculiar interest.

The varieties of Dorkings usually recognized

are the *Gray* or *Colored*, *Silver Gray* and *White*. The *White* are believed to be the original breed, from which the colored varieties were produced by crossing with the old *Sussex* or some other large colored fowl. That such was the case is almost proved by the fact that only a few years ago nothing was more uncertain than the appearance of the fifth toe in colored chickens, even of the best strains. Such uncertainty in



GRAY DORKINGS.

any important point is always an indication of mixed blood; and that it was so in this case is shown by the result of long and careful breeding, which has now rendered the fifth toe permanent, and finally established the variety.

In no breed are size, form and weight so much regarded in judging the merits of a pen. The body should be deep and full, the breast being protuberant and plump, especially in the cock, whose breast, as viewed sideways, ought to form a right angle with the lower part of his body. Both back and breast must be broad, the latter showing no approach to hollowness, and the entire general make full and plump, but neat and

compact. Hence a good bird should weigh more than it appears to do. It is difficult to give a standard, but we consider that a cock which weighed less than 10 lbs., or a hen under 8½ lbs., would stand a poor chance at a first-class show; and cocks have been shown weighing over 14 lbs. This refers to the colored variety. White Dorkings have degenerated, and are somewhat less.

The legs must be white, with perhaps a slight rosy tinge; and it is imperative that each foot exhibits behind the well-known double toe, perfectly developed, but not running into monstrosities of any kind, as it is rather prone to do. An excessively large toe, or a triple toe, or the fifth toe being some distance above the ordinary one, or the cock's spurs turning outward instead of inward, would be glaring faults in a show pen.

The comb may, in colored birds, be either single or double, but all in one pen must match. The single comb of a cock should be large and perfectly erect. White Dorkings should have double or rose combs, broad in front at the beak, and ending in a raised point behind, with no hollow in the center.

In the Gray variety the color is not material, so long as the two hens in the pen match. The cock's breast may be either black or mottled with white; the hackle, back and saddle are usually white, more or less striped with black; and the wing often nearly white, with a well-defined black bar across.

In the Silver Gray Dorking, however, color is imperative. This variety, there is not the slightest doubt, was at first a chance offshoot from the preceding, but has been perpetuated by careful breeding. Colored birds will occasionally throw silver-gray chickens, and such are sometimes exhibited as "bred" Silver Grays; but it is needless to add that disappointment is sure to ensue, unless the strain has been kept pure for many generations. The Silver Gray color is as follows: Cock's breast a pure and perfect black; tail and larger coverts also black, with metallic reflections; head, hackle, back and saddle feathers pure silvery white; and the wing-bow also white, showing up well a sharply-marked and brilliant bar of black across the middle. A single white feather in the tail would be fatal. Hen's breast salmon-red, shading into gray at the thighs; head and neck silvery white, striped with black; back "silver gray," the white of the quill showing as a white streak down the center of each feather; wings also gray, with no shade of red; tail dark gray, passing into black in the inside. The general appearance of both birds should be extremely clean and aristocratic.

The white birds should be what their name

implies—a clear, pure and perfect white. There is generally in the cock more or less tendency to straw or cream color on the back and wings, and this should by no means disqualify a really first-class bird in all other points on account of it; but it is decidedly a fault.

White Dorkings are usually much smaller than the colored, which fact is believed to have hindered the popularity of this truly exquisite variety.

The Dorking is not, however, a good layer, except when very young; and in winter is even decidedly bad in this respect. The chickens are also of very delicate constitution when bred in confinement, and a few weeks of cold wet weather will sometimes carry off nearly a whole brood; they ought not, therefore, to be hatched before May. But it is only right to say that when allowed unlimited range the breed appears hardy, and as easy to rear as any other, if not hatched too soon.

French Fowls.—The varieties of French breeds best known in the United States are the Houdans, the Crèveœurs, La Flèche and the Breda.

Houdans.—This fowl resembles the Dorking in many respects, and Dorking blood has evidently assisted in its formation. Houdans have the



HOUDAN COCK.

size, deep compact body, short legs and fifth toe of the Dorking, but with less offal and smaller bones. The plumage varies considerably, but is most usually white, with large black spangles. The head should be surmounted by a good Polish crest of black and white feathers. The wattles are pendent and well developed, and the comb is the most peculiar in formation of all the French breeds, resembling, as has been said, the two leaves of a book opened, with a long, strawberry in the center: in the hen it should be very small

and rudimentary. Imported Houdans frequently want the fifth toe, evidently derived from the Dorking. The chickens feather very rapidly and early, but are nevertheless exceedingly hardy, perhaps more so than any except Cochins or Brahmans, and are therefore easily reared with little loss. They are emphatically the fowl for a farmer, and will yield an ample profit on good feeding, both in eggs and flesh.

Almost their only drawback is their refusal to incubate. Many, however, will consider this an advantage. The bird will bear a moderate amount of confinement well, but in this respect is not quite equal to

The Crève-cœur.—This breed is the one most preferred in France for the quantity and quality of its flesh. The full-grown cock will not unfrequently weigh 10 pounds, but $7\frac{1}{2}$ to 8 pounds is a good average. In form the Crève is very full and compact, and the legs are exceedingly short, especially in the hens, which appear almost as if creeping about on the ground. In accordance with this conformation, their motions are very quiet and deliberate, and they appear the most contented in confinement of any fowls we know. The comb is in the form of two well-developed horns, surmounted by a large black crest, giving the bird a very "diabolical" appearance. Wattles full, and like the comb, a very dark red. The throat is also furnished with ample whiskers and beard. Plumage mostly black, but in the largest and finest birds not unfrequently mixed with gold or straw on the hackle and saddle. The merits of the Crève consist in its edible qualities, early maturity, the facility with which it can be both kept and reared in confinement, and the fine large size of its eggs. The hen is, however, only a moderate layer, and the eggs are often sterile.

La Flèche.—In appearance this variety resembles the Spanish, from which it is believed to have been partly derived, but exceeds that breed in size, the cock often weighing from 8 to even 10 pounds. Both sexes have a large, long body, standing on long and powerful legs, and always weighing more than it appears, on account of the dense and close-fitting plumage. The legs are slate-color, turning with age to a leaden gray. The plumage resembles the Spanish, being a dense black with green reflections. The look of the head is peculiar, the comb being not only two-horned, much like the Crève-cœur, near the top of the head, but also appearing in the form of two little studs or points just in front of the nostrils. The wattles are very long and pendulous, of a brilliant red color, like the comb. The ear-lobes are dead white, like the Spanish, and exceedingly developed, meeting under the neck in good specimens. In fact, no breed

could show stronger traces of its Spanish origin. The appearance of the La Flèche fowl is very bold and intelligent, and its habits active and lively. The hen is an excellent layer of very large white eggs, and does not sit. The flesh is excellent, and the fine white transparent skin makes a very favorable appearance on the table, which is only marred by the dark legs. The breed is, however, very delicate, and does not lay well in winter, except in favorable circumstances. As an egg-producer it is as nearly as possible similar to the Spanish, not only in the size and number of the eggs, but the seasons and circumstances in which they may be expected. In juiciness and flavor the flesh approaches nearer to that of the Game fowl than any other breed. The cocks suffer much from leg-weakness and disease of the knee-joint. They require, therefore, special care and the moderate use of stimulants.

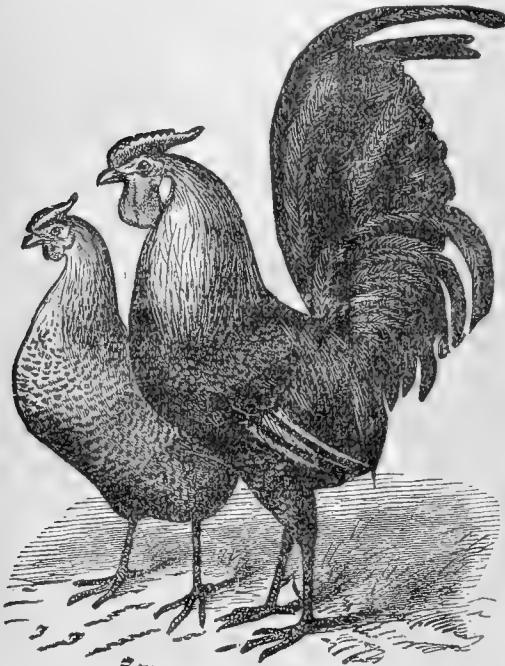
Breda, or Gueldres.—This fowl is of exceedingly well-proportioned shape, with a wide, full, prominent breast. The head carries a small top-knot and surmounts a rather short, thick neck. The comb is very peculiar, being hollowed or depressed instead of projecting, which gives to the head a most singular expression. Cheeks and ear-lobes red; wattles ditto, and in the cock very long and pendulous. The thighs are well furnished and vulture-hocked, and the shanks of the legs feathered to the toes, though not very heavily. The plumage varies, black, white and cuckoo or mottled being most seen. The cuckoo-colored are known exclusively by the name of Gueldres, and the black bear chiefly the name of Bredas; but it is much to be desired that one name should be given to the whole class, with simply a prefix to denote the color. The flesh is excellent and tolerably plentiful, very large cocks weighing as much as 8, or 9 pounds. They are very good layers, and the eggs are large. Like the other French breeds, the hens do not sit. The chickens are hardy, and the breed is decidedly useful.

Spanish Fowls.—Some of the Spanish varieties, as the Minorca or Red-faced Black, the Ancona, the Gray or Mottled, and the Andalusian or Blue Spanish, have long been prized in the United States for their great laying and non-sitting qualities, and as good table-birds, but are too delicate for a northern climate, and do not do well anywhere when exposed to wet. To the average farmer they are not a valuable breed.

Hamburgs.—Under the name of Hamburgs are now collected several varieties of fowls—Black Hamburg, Gold and Silver Penciled, and Gold and Silver Spangled—presenting the general characteristics of rather small size; brilliant rose combs, ending in a spike behind, projecting upward;

blue legs, and beautifully penciled or spangled plumage. None of the Hamburgs ever show any disposition to sit unless in a state of great freedom, but lay nearly every day all through the year, except during the moulting season, whence they used to be called "Dutch every-day layers."

Hamburgs are strongly commended as a profitable breed. Each hen will lay from 200 to 250 eggs in a year, which certainly exceeds the production of any other fowl; and if they are generally small, the consumption of food is comparatively even more so. Though naturally loving a wide range, there is no real difficulty in keeping them in confinement, if cleanliness be attended to.



GOLDEN-PENCILED HAMBURGS.

The great difficulty in keeping them arises from their erratic propensities. Small and light, they fly like birds, and even a 10-foot fence will not retain them in a small run. They may, it is true, be kept in a shed; but if so, the number must be very limited. Where six Brahmans would be kept four Hamburgs are quite enough, and they must be kept dry and scrupulously clean. The penciled birds are also, most certainly, delicate, being very liable to roup if exposed to cold or wet; they should not, therefore, be hatched before May. The spangled are hardy, and lay larger eggs than the penciled; but the latter lay rather the most in number. For profit, however, we should recommend the Black Hamburg, on account of the large size of the eggs; and this variety is certainly the most extraordinary egg-producer of all breeds known.

Hamburgs are too small to figure much on the table. They carry, however, from the smallness of the bones, rather more meat than might be expected, and what there is of it is of first-rate quality and flavor.

Leghorn Fowls, except in color, are of the Spanish type. The White Leghorn is the most popular, though some fancy the Brown. The former variety are among the most elegant of farm-yard fowls. In appearance they closely resemble the Spanish, except that the plumage is white, with hackle or neck, and the saddle or rump feathers, golden-tinged. But whatever their color, the



STANDARD WHITE LEGHORNS.

Leghorns all have the good laying qualities of the Spanish, without their delicacy, and indeed equal the Hamburgs in every good point.

American Breeds.—There are only three distinctive American breeds that have gained wide celebrity—the Dominiques, the Ostrich fowls and the Plymouth Rocks.

Dominiques are probably one of the oldest varieties, and resemble the cuckoo-colored fowls known as Scotch Grays, with the exception of having rose combs and yellow legs. They are plump and tender on the table, and capital layers, and might make a valuable cross for the Cuckoo Dorking. In color they are slaty-blue of a soft undulating shade on a light ground all over the body, forming narrow bands, and delicately penciled among the smaller feathers. The feet and legs should be bright yellow or buff,

and the bill of the same color. The combs of the cocks vary, some having a single and others a double comb.



DOMINIQUE FOWL.

The Ostrich breed are highly valued in Bucks County, Penn.—their native region—for their hardiness, weight, excellent laying qualities and fine flesh. The hens at maturity will weigh from 7 to 8 pounds, and often lay as many as 40 eggs before sitting. The cock's color is blue-black, the



OSTRICH FOWLS.

ends of the feathers tipped with white, the wings a golden or yellow tinge, the hackle a rich dark blue; the hens are similarly but more soberly marked. The cock has a double rose-colored comb and large wattles; the comb of the hen being single, high and serrated. The legs are short and the body plump.

Plymouth Rocks are apparently only a cross between Dominiques and Cochins. They nearly resemble Cuckoo Cochins in all but having clean legs. This breed has never become extensively

popular, and can only be recommended to those who desire a large bird of the Asiatic type without the accompaniment of leg-feather. In recent years an Improved Plymouth has appeared which shows careful and uniform breeding, and is said to grow fast, fledge early, take on flesh rapidly, and to combine excellent qualities as an egg-producer and as a table-bird.

Cochin-Chinas, or Shanghais.—As now brought to perfection, this breed presents the following characteristics:

The cock ought to weigh not less than 10 or 11 pounds; the hens from 8 to 9 or 10 pounds. The breast in both sexes should be broad and full. The neck can hardly be too short in either sex, so that it does not look clumsy; and the back must be short from head to tail, and very broad. The legs to be short and set widely apart, and the general make to be as full, wide and deep as possible. The shanks are profusely feathered down to the toes, and the thighs should be plentifully furnished with the fine downy feathers denominated "fluff." The color of the shanks is yellow, a tinge of red being rather a recommendation than otherwise. The head should be neat and rather small; the comb of moderate size, straight, erect and evenly serrated. The ear-lobes must be pure red. The tail of the hen is very small, and nearly covered by the feathers of the saddle, which are very plentiful and form a softly rising cushion on the posterior part of the back; the tail of the cock is larger than in the hen, but still small and not very erect; the wings in both sexes very small, neatly and closely folded in, and the general carriage noble and majestic. The principal colors now bred are white, buff and partridge. The white and buff are most popular.

The chickens, though they feather slowly, are hardier than any other breed except Brahmas, and will thrive where others would perish; they grow fast, and may be killed when twelve weeks old. The fowls will do well in very confined space; are very tame and easily domesticated, and seldom quarrel. They cannot fly, and a fence two feet high will effectually keep them within bounds. As sitters and mothers the hens are unsurpassed; though they are, unless cooped, apt to leave their chickens and lay again too soon for very early broods. Lastly, they are prolific layers, especially in winter when eggs are most scarce.

This breed is considered most useful to supply the family demand for either chickens or eggs, or to provide sitters for numerous broods; but it is little valued as a market fowl unless crossed with the Dorking or Crève-cœur; neither will it be found profitable where eggs are the sole consideration, and the hens cannot be allowed to indulge their sitting propensities.

Brahmas.—The following description of *Light Brahmas* has been carefully drawn up under the supervision of John Pares, Esq., of Postford, near Guildford, Eng., well known as the most eminent exhibitor of this variety for many years past :

“Light Brahmas are chiefly white in the color of the plumage; but if the feathers be parted, the bottom color will often be found of a bluish gray, showing an important distinction between them and white Cochins, in which the feathers are always white down to the skin. The neck-hackles should be distinctly striped with black down the center of each feather. That of the cock is, however, often lighter than in the case of the hen. The back should be quite white in both sexes.

“The wings should appear white when folded, but the flight-feathers are black.

“The tail should be black in both sexes. In the cock it is well developed, and the coverts show splendid green reflections in the light. It should stand tolerably upright, and open well out laterally like a fan.

“The legs ought to be yellow, and well covered with white feathers, which may or may not be very slightly mottled with black: vulture-hocks are a great defect.

“The ear-lobes must be pure red; and every bird should, of course, have a perfect pea-comb.”

The *Dark*, or *Penciled*, Brahmas are similar to the above in comb, form, symmetry, etc., but as different in color as can well be. The following description is by an eminent English breeder :

“The head of a perfect Brahma cock should be surmounted by a good ‘pea-comb,’ which resembles three small combs running parallel the length of the head, the center one slightly the highest, but all evenly serrated and straight, and the whole low and set firm on the head. Beak strong, well curved, and the color of horn. Wattles full; ear-lobes perfectly red, well rounded and falling below the wattles.

“His neck should be rather short, but well curved, with very full hackle, which is silvery white, striped with black, and ought to flow well over the back and sides of the breast. At the head the feathers should be white. Back very short, wide and flat, rather rising into a dainty, soft, small tail, carried upright. The back almost white. The saddle-feathers white, striped with black, as in the neck, and the longer they are the better. The soft rise from the saddle to the tail, and the side feathers of the tail, to be pure lustrous green-black, except a few next the saddle, which may be slightly ticked with white: the tail-feathers themselves pure black.

“The breast should either be all black, or black with each feather slightly and evenly

tipped with white, but on no account splashes of white; it should be well carried forward, full and broad. Wings small, and well tucked up under the saddle-feathers and thigh-fluff. A good sharply defined black bar across the wing is very important.

“The fluff on the thighs and hinder parts ought to be black or very dark gray. The lower part of the thighs should have plenty of delicate soft feathers, almost black, rounding off about the joint and hiding it, but on no account running into vulture-hocks, which are a great eyesore.

“The cock should carry himself upright and sprightly, and great width and depth are important points; a good bird should show great size and ‘look big.’

“The hen’s head should be small, with a perfect pea-comb as in the cock, but smaller; and the beak also resembling his in the decided curve and color. Wattles quite small and neatly rounded, the red ears hanging below them. Neck short, and gradually enlarging from head to shoulders. Feathers about the head grayish, verging to white, and the hackle more striped with black than in the cock.

“General make of the back, tail, thighs, wings and breast the same as in the cock, but of course in proportion.

“The color of the hen, except the neck and tail, is the same all over, each feather, even up to the throat on breast, having a dingy white ground, very much and closely penciled with dark steel-gray. The penciling on the throat and breast is very important, and is one of the first points looked at in a prize hen.

“The hen’s legs are short and thick, not quite so yellow as the cock’s, and profusely feathered on the outside with feathers the same color as the body. Her carriage is scarcely so upright as that of the male bird.”

With regard to the *merits of Brahmas*, they must certainly rank very high. In size the dark variety surpasses every other breed yet known; the heaviest cock ever recorded, so far as we are aware, having attained the enormous weight of *eighteen pounds*, and thirteen and fourteen being not uncommon at good shows; though only good strains reach this weight, and miserable specimens are often seen which are inferior in size to Cochins. They also lay nearly every day, even in the depth of winter, and if pure-bred scarcely ever sit till they have laid at least thirty or forty eggs. When they sit more frequently, the hen will usually be very brown, and is, we believe, crossed with the Shanghai. As winter layers, no breed equals them. Brahmas are likewise very hardy, and grow uncommonly fast, being, therefore, very early ready for table, in which particular they are profitable fowls, having plenty

of breast-meat. They bear confinement as well as Cochins, but are far more sprightly, and scarcely ever, like them, get out of condition from over-feeding.

The flesh, however, though better than that of Cochins, is much inferior, after six months, to that of the Dorking; and this is their only real fault; but a cross with a Crève-cœur or Dorking cock produces the most splendid table-fowls possible, carrying almost incredible quantities of meat of excellent quality. Such a cross is well worth the attention of the farmer.

On the whole, there is no more profitable fowl "all round" than the Brahma; and a few hens at least should form part of the stock of every moderate yard.

Game.—No variety of fowl has been so enthusiastically cultivated by amateurs as the Game, and in none perhaps is there so much room for legitimate difference of opinion. The varieties are legion; and to describe every one would be hopeless, except in a work specially devoted to the purpose. We shall therefore only give descriptions of the leading breeds, as written by Trevor Dickens, Esq., of London, one of the most eminent authorities on all points connected with the Game fowl.

"*The Game Cock*, as the undisputed king of all poultry, requires more careful judging in regard to shape than any other bird. The Brown-reds have long been most perfect in outline; but the following description will apply to a perfect bird of any breed:

"The beak should be strong, curved, long and sharp; the comb single, small and thin, low in front, erect and evenly serrated; it is usually red, but sometimes darkish red. Head long and sharp, with the face and throat lean and thin. Ear-lobes small and red, never whitish. Neck long, strong and well-arched; the hackle short, hard, close, firm, and broad in the feather; Back short, and very hard both in flesh and feather; broad at shoulders, narrow at tail; and rounded at the sides. Breast broad and very hard; but not by any means too lean or too full—the last would be useless weight; a good hard breast is most essential, as it is the most vulnerable part of the bird. The rump should be narrow, neat and short, the saddle-feathers close, hard and short. Wings very strong, and of a just medium length, well rounded to the body, and carried neither high nor low, but so as to protect the thighs. Very long-winged birds are usually too long in the body, and short-winged birds too broad in the stern. Tail neither long nor short, but medium length, and carried erect to show good spirit, but not 'squirrel-fashion' over the back; it should be 'well fanned,' or spreading, and the sickle-feathers of a good round full

curve, and standing clearly above the points of the quill tail-feathers. Very long-tailed birds are soft and long-bodied, and short-tailed birds are too short-winged, and often have broad rumps; thighs short and very muscular, hard and firm; placed well, wide apart, and well up to the shoulders, in order to give a fine fore-hand and make the bird stand firm on his legs; which latter should be sufficiently long, but not too much so, and placed wide apart as the thighs. Spurs low down, long, sharp and rather thin; curved slightly upward, and not turning in too much. Feet flat, broad, spreading and thin; the claws and nails straight, long and strong; the back claw especially long and flat to the ground, to give a firm footing. The whole plumage should be very close, short and hard, with glossy reflections, and the quills or stems strong and elastic. Body in hand short and very hard, and the general carriage upright, quick, fierce and sharp. The back is best rather curved, provided it be flat crosswise, and not hump-backed or lopsided. Weight for exhibition, $4\frac{1}{2}$ to $5\frac{1}{2}$ lbs.; for the pit, not over $4\frac{1}{2}$ lbs.

"*The Hen* should correspond in form, but of course in proportion, hardness of flesh and feather, with shortness of body, being main points. Good hens generally become spurred, and such breed the hardest and best cocks. The proper weight of a hen is from 3 to $3\frac{1}{2}$ pounds.

"A short or clumsy head, short or soft neck, long body, narrow shoulders, long thighs, legs set close together, loose or soft plumage, and especially what is known as a 'duck-foot,' are serious defects. It should be remembered that a Game fowl is always judged mainly in reference to its fighting qualities, and anything which interferes with them is a fault in the bird.

"With respect to the varieties of Game, the sorts which take nearly all the prizes and cups are the Brown-red, Black-breasted Red, Silver Duck-wing Grays, and Piles; all which are cup-birds.

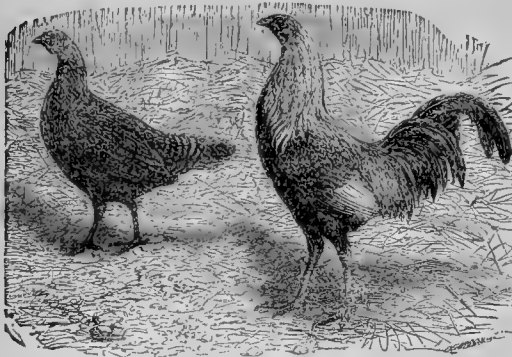
"*The Brown-red* is essentially dark in blood, the eyes being a very dark brown, with a comb and face inclining to a dark gypsy purple, and the beak dark also. Breast of the cock a red-brown, shoulders sometimes passing into a rich orange-red color. Wing-butts of a dusky or dark smoky brown, and general color a dark red. Legs dark iron-brown or blackish bronze, with dark talons. Hackle with dark stripes, and thighs like the breast. The tail a dark greenish black, and the wing is often crossed with a glossy green bar. The general color of the hen is very dark brown, grained or penciled with lighter brown; her neck-hackle a dark golden copper-red, thickly striped with dark stripes; and her comb and face darker than in the cock-bird.

Good hens are usually spurred, and their tail-feathers show a slight curve.

"The Brown-red, of all the breeds, take the most cups at the principal shows. They are also the favorite breed with sportsmen, and are best in shape of all; but, like all the dark-combed varieties, are not such good layers as those with bright red combs.

"*Black-breasted Reds* are essentially red-blooded birds, the plumage being generally a bright red, rather deeper on the body than in the hackle. Red eyes are absolutely essential to good birds, all others being inferior, and infallibly denoting a cross. The cock's wings are bright red in the upper part and rich red chestnut in the lower, with a steel-blue bar across; breast bluish black, with glossy reflections; thighs the same; tail greenish black, the feathers without much down at the roots. The comb and wattles of all Black-reds must be bright red, and the legs are usually willow-color in cup birds, though any leg will do if the birds are bright in color and have red eyes. The general color of the hen is a rich red partridge-brown, with a red fawn-colored breast, and reddish golden hackle with dark stripes; the cock's hackle also is striped underneath, but clear above. Spurred hens are the best, but are not so frequent as in the preceding variety.

"*Silver Duck-wing Grays* are purer in blood than the Yellow or Birchen Duck-wings, and are white-skinned when of pure breed. General



DUCK-WING GAME.

color of the cock a silver gray; hackle striped with black underneath, but clear above; back a clear silver-gray; breast either bluish black or clear mealy silver-color; wing crossed with a steel-blue bar, and the lower part of a creamy white; tail greenish glossy black. Hen a silvery bluish gray, thickly frosted with silver; breast a pale fawn-color; neck-hackle silvery white, striped with black. The comb and face in both sexes are bright red. The legs may be either white, blue or willow; but of course the whole pen must match, and white leg to silver feather-

ing is certainly the most correct match. Willow is, however, most common in the legs, but least pure in blood; the white- or blue-legged birds being the true-bred Silver Duck-wings. Eyes should be red in Willow- and Blue-legged strains, and yellow in Yellow- and White-legged strains in all the Duck-wing Game fowls.

"The *Yellow Duck-wings* are similar to the above except in the straw-color or birchen tinge and the copper-colored saddle. They have yellow skins and willow or yellow legs. In this variety the cock's breast is always black, the hen's a pale fawn-color, whilst the silver hen often has a clear mealy or silver breast instead of fawn.

"Red eyes and willow legs are the only correct colors for prize Duck-wings; bright red eyes and white legs for prize Piles.

"The color called *Piles* consists, in the cock, of a bright red piled on a white ground, the hackle being red and white striped; the back is chiefly red, and the breast mostly white, but often with red markings; the tail should be white, but a few red feathers are not amiss; black in the tail, as seen in the Worcestershire Piles, is, however, very objectionable. The hens are red-streaked or veined on a white ground, the breast redder than the cock, and the tail white, with a few red feathers occasionally. The reddest Piles are the best birds, and prize pens should be selected with bright red eyes and white legs.

"*Whites* should have bright red eyes, and white legs are essential.

"*Black Game* fowls should have black eyes and bluish-black legs. Have won a few cups.

"*Dark Grays* ought always to have black eyes and legs. The hens are very dark.

"The original wild varieties of Game fowls are three: (1) The Black-breasted Red, with fawn-breasted partridge hens; (2) Brown-breasted Reds, with dark legs, and dark brown (not black) hens; and (3) Red-breasted Ginger Reds with yellow legs, and the hens a light partridge-color. These three colors were probably reclaimed at a very early period, and are still found in India as wild birds. From them all the other colors were originally bred; the varieties hatching dark chickens from the brown or dark reds, and all others from the other two sorts. These varieties can be merely named, and are most conveniently classed thus, according to the color of their chickens when hatched:

LIGHT CHICKENS.	STRIPED CHICKENS.	DARK CHICKENS.
1. Whites.	5. Black-br. Reds.	10. Brown Reds.
2. Piles.	6. Red-br. Ginger	11. Dark Grays.
3. Blue Duns.	Reds.	12. Dark Birchens.
4. Red Duns.	7. Duck-wings.	13. Black.
	8. Yellow Birchens.	
	9. Mealy Grays.	

"There are also four other varieties not generally known, called Red Furnaces, Cuckoos, Span-gles and Polecats, making at least seventeen well-defined sorts of Game fowls; but besides these there are at least twenty-seven named sub-varieties, or forty-four in all. To describe these in detail would be useless, and I shall only, therefore, add the following general remark:

"The best criterion of blood in all Game fowls is the *color of the eyes*, a point which has been, strange to say, totally overlooked in every work on poultry hitherto published. *Black* eyes show dark blood, and the hens of such strains lay white eggs. *Red* eyes denote red blood, and lay pinkish eggs. *Yellow* or *daw* eyes lay yellowish eggs. These last are inferior in spirit to the others. Brown and bay eyes result from crossing different breeds:

"The only sorts of much use for fighting are those with black or red eyes, and the three varieties now usually employed are the Brown-breasted Reds, Dark Grays (which are strongest and hardest of all), and Black-breasted Reds, with white legs and dark red eyes. The sorts which fight the quickest are, however, the Red Cheshire Piles, with bright red eyes and white legs, the Red-breasted Ginger Reds, with bright red eyes and yellow legs, and Whites, with white legs and bright red eyes; but they have not quite so much strength and power of endurance. The Black-breasted Reds with willow legs are generally too slow and soft for the pit, as are the Blacks also.

"The best layers are the Black-breasted Reds with willow legs, the hens being partridge-color; and Red Cheshire Piles with white legs. The worst layers are the grays, Dark Grays and Dark Birchens being worst of all. With the exception of these, Game fowls lay remarkably well, and in favorable circumstances will, I believe, surpass any breed. My willow-legged Black-breasted Red hens have averaged from 211 to 284 eggs per annum. To reach this, however, they will require a good run, but if well attended to are always good layers. It is worth remarking that yellow- and blue-legged birds generally lay best in all poultry.

"Game-cock chickens should be shown undubbed; but at their first Christmas they become 'stags,' and should then have their comb and wattles taken neatly and closely off with a very sharp pair of scissors.

"Different varieties ought not to be crossed, but kept distinct. In breeding either for stock or exhibition, nothing is so necessary as to have a good proportion of cocks. There should be one to every six hens at least; and as in a large yard it is impossible, from their pugnacity, to keep more than one full-grown brood-cock, there

should be a good supply of fine young birds or 'stags' kept under him, and breeding with the hens, when all the eggs will be fecundated, and the chicks vigorous and healthy. This is the only way of breeding good stock from a large yard; and it is of course preferable, when practicable, to keep each cock to his own limited family of hens. Pullets ought never to be bred from at all, and should be kept away from the cocks, using their eggs for household purposes. Good old birds will always breed strong chickens, and in this breed it scarcely matters how old they are so long as they remain strong and healthy. The breeding-pens should be selected with great care, not from the largest, but from the best-shaped and strongest birds. The more cock chicks in a brood the better, as it is always an evidence of strength and vigor in the strain; and the pullets, though fewer, are finer and handsomer birds invariably.

"Game eggs should not be hatched before the 21st of March nor after the end of May. This breed is of warmer blood and stronger constitution than any other, and the chicks consequently hatch earlier, often breaking the shell at the end of the nineteenth day. As soon as they begin to fight, the cocks should be separated, and, if possible, put out to 'walk' at a farm; the pullets will rarely injure themselves, and their quarrels are only amusing."

On the whole, this breed is pronounced the very one for a country gentleman who can give his fowls ample range; and it will in such circumstances afford a constant and abundant supply of the most delicious eggs and meat to be obtained. Their good laying qualities may also recommend them to the farmer in some localities. But they cannot be considered a profitable breed for domestic purposes in general, or to those whose object in poultry-keeping is to supply the market with table-birds.

KEEPING AND REARING POULTRY.

Hen-Houses.—Until proper housing accommodation is provided, the sort of prejudice that exists with many farmers against poultry, as being more destructive than profitable, is not likely to be removed. Of course, when the fowls have a cold, damp, imperfectly thatched, irregularly cleaned, ill-lighted habitation, and are otherwise inadequately attended to, they do become more a pest than a pleasure or profit, for they stray away, roosting in the cow-house, the stable, or the cart-sheds, and thus court the hostility alike of the farmer, cattleman, and horseman. Eggs, too, are dropped in nearly every conceivable place about the barns, and often not discovered till either rotten or broken. In this carelessly kept state the mischievous propensities of the fowls

are fully demonstrated. During the day they catter the most of their food on the grass and other fields, and about the barns, often doing mischief. Treated in this manner, eggs are comparatively few, and the birds are not so big nor so valuable in any respect.

That poultry can be kept with profit seems undoubted, if the animals are properly treated. One of the primary if not the principal means to this profitable end, however, is unmistakably good house-accommodation; and though hen-houses are rapidly improving, there is still much to accomplish in this direction.

The results would amply reward any additional trouble and expense involved by a more speedy substitution of comfortably erected hen-houses for the pitiful sheds still existing in some parts, though happily on the wane. Without cleanliness and warmth in the hen-house, any amount of attention otherwise will not realize nearly the maximum profit. Every poultry-house should be well cleaned at least once a week, to free it from vermin, hurtful odors, etc. At farms and other places where a great stock of poultry is kept, a proper house, with separate accommodation for the different varieties, should be provided. The hen-house should have at least four compartments and a court-yard. The annexed

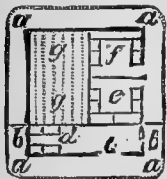


FIG. 1.

figure exhibits the requisite accommodation: *a a*, the court-yard; *b b*, for ducks and geese, the apartment for which is at *c*, with laying and hatching nests, *d*; *g*, the roosting-house for hens and turkeys; *e*, the hatching-house; and *f*, the apartment for laying. Each compartment should be provided with a shutter-door, which must be closed every night. If, through inattention, the hen-house should become tainted, the health of its inmates will be greatly endangered. A new site should be chosen, and another house erected, or fumigation resorted to. Care should be taken in the selection of the site to have it on a dry, sloping piece of ground, with a southern exposure, and well sheltered. Ventilation, light and warmth ought never to be lost sight of in the construction of these houses. Into the more modern poultry-houses steam heating-pipes have been introduced, which admit of the hatching of chickens early in spring very successfully, and keep the hens in laying trim over the most of winter. The enhanced price of eggs in winter, and the advantage of getting chickens early into the market, are declared by those who have experience to repay fully the cost of the artificial heating. The roof should be quite weather-tight, as poultry never thrive when exposed either to cold draughts or

moisture. The interior should be at least six feet high, for the convenience of the person who cleans the house. The perches should be placed so that the fowls on the top row may not be immediately above those on the second, and so on; a hen-ladder must be provided, but this, like the roosts, should not be too high, as fowls are apt to injure themselves by flying from lofty perches. The floors should be strewn with sand or dry earth, and swept clean every day; those sweepings will be found most useful for the garden. The door should be kept open in fine weather for the sake of ventilation; it should also have a hole at the bottom, with a sliding panel.

The laying-boxes require frequent washing

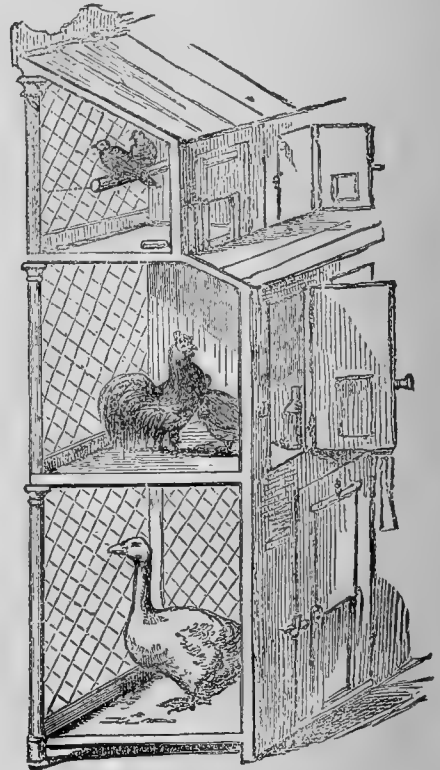


FIG. 2.—POULTRY-PEN.

with hot lime-water inside, to free them from vermin, which greatly torment the sitting hens. For the same purpose, poultry should always have a heap of dry sand or fine ashes, laid under some covered place or shady tree, near the yard, to dust themselves in, this being their resource for getting rid of the vermin with which they are annoyed. The poultry-yard should contain some lime in a dry mortar state, of which the fowls eat a little. It is necessary for the formation of the egg-shell. If possible, also, the yard should include a patch of grassland.

Fig. 2 represents a section of a range of pens for the exhibition of poultry of the various kinds,

constructed on the principle of showing all the animals of the same species under the same light, and the same conditions generally. The suit of ground-compartments is adapted for geese, ducks, turkeys, rabbits; the next stage is for gallinaceous fowls of the various breeds; and the upper stage is provided with a perch for pigeons; and might also be used for dwarf-fowls. It is a French design.

Feeding.—Most persons are doubtless aware that fowls swallow food without mastication. That process is rendered unnecessary by the provision of a *crop*, an organ which is somewhat similar to the first stomach of the cow, and in which the food from the gullet is macerated, and partly dissolved by secreted fluids. From the crop the food passes downward into a second small cavity, where it is partly acted on by a digestive juice; and finally it is transferred to the gizzard, or last stomach, which is furnished with muscular and cartilaginous linings of very great strength. In the gizzard the partially softened food is triturated, and converted into a thin paste, fit to be received into the chyle-gut, and finally absorbed into the circulation. Such is the power of the gizzard in almost all kinds of poultry, that hollow globes of glass are reduced in it to fine powder in a few hours. The most rough and jagged bodies do no injury to the coats of the gizzard. Spallanzani even introduced a ball of lead, with twelve strong needles so fixed in it that their points projected a fourth of an inch from the surface, and the result was that all the needles, with the exception of one or two, were ground down in a short time to the surface of the ball, while those left were reduced to mere stumps. To add to the triturating powers of the gizzard, fowls are gifted with the faculty of swallowing gravel with their food!

Fowls, when left to roam at large, pick up all sorts of seeds, grains, worms, larvæ of insects, or any other edible substances they can discover, either on the surface of the ground or by scraping. They also pick a little grass as a stomachic. The more that hens can be allowed to run about to gather their food, provided always their housing is good, and supplementary feeding judicious, the better for their health and for the pockets of the owner. It has been demonstrated that some of the more fashionable breeds will turn out remunerative even when kept in comparative confinement and fed artificially; but this process requires the strictest attention to character of the diet, and considerable skill in the produce of poultry.

Going at large over a farm, the fowls at certain seasons damage some kinds of crops, and in consequence the number of birds fed in large yards

regularly, in comparative confinement, especially about the larger farms, is gradually increasing.

In a state of domestication, the hard food of which fowls seem most fond are peas, barley, oats, etc.; and besides a proportion of these, they may be given crumbs of bread, lumps of boiled potatoes, not too cold, cabbage, turnips chopped small, etc. They are much pleased to pick a bone; the pickings warm them, and excite their laying propensities. If they can be supplied with caterpillars, worms or maggots, the same end will be served. Any species of animal food, however, should be administered sparingly; and the staple articles of diet must always be of a vegetable nature. They should be fed three times a day. When wanted for the table, the quantity of food may be increased, and be more substantial; they should also be kept more within the coop, and as quiet as possible. A fortnight's feeding in this way will bring a fowl of a good breed up to a plump condition. The flavor of the chicken on the table will be enriched by feeding for ten days or so with oat and barley meal, and with a little sweet milk to drink. To be valuable in the nest, or on the table, none of those fashionably bred, early matured fowls should be kept longer than two years, though many, indeed most, of the old barn-door birds are kept with advantage longer.

The duties of hen-wife should be discharged constantly by one and the same person, as the voice and presence of a stranger scare the fowls, and disturb the operations of the hen-house. The profits of the poultry department are very often considerably lessened by a breach of the above rule, by intrusting the duties of the hen-wife to perhaps, in the case of a large growing family, half a dozen different individuals in one day, and occasionally to mere urchins.

Laying.—The ordinary productiveness of the hen is truly astonishing, as it usually lays, in the course of a year, 200 eggs, provided it has not unnatural confinement, is well fed, and has a plentiful supply of water. Instances have been known of hens laying 300 in a year. This is a singular provision in nature, and it would appear to have been intended peculiarly for the use of man, as the hen usually incubates only once in a year, or at most twice. Few hens are capable of hatching more than from twelve to fifteen eggs; so that, allowing they were all to sit twice a year, and bring out fifteen at a time, there would still be at least 170 spare eggs for the use of man. It is therefore evident that, in situations where hens have comparative freedom, are well fed, and otherwise carefully attended, they must prove very profitable. As the number of eggs which are annually brought out by a hen bear no proportion to the number which she lays, schemes—

to be subsequently noticed—have been imagined to hatch all the eggs of a hen, and thus turn her produce to the greatest advantage; so that, in place of twelve or fourteen chickens, upward of 200 may be raised from the annual produce of a single fowl.

Hens will lay eggs which have received no impregnation, but from these, as a matter of course, no hatching can take place; they are equally good, however, for eating. When the chief object is to breed chickens, a cock should be allowed to walk with ten or twelve hens; but when eggs are principally required, the number of hens may be from fifteen to twenty. Endeavor to procure a cock of a good breed, not game, and let him be in his prime, which is at eighteen months to two years old. Cocks will last two years, after which they lose their liveliness of colors, and become languid, inactive, and mere consumers of food. It is fit, therefore, that younger cocks should then take their place in the poultry-yard. Crowing hens should be rejected, as worthless layers.

If left to themselves, hens produce not more than two broods a year. Early spring, and, after a cessation, the end of summer, are the two seasons in which they begin naturally to lay. In the depth of winter, under ordinary circumstances, hens very rarely lay eggs, though, by artificial means, as already explained, they can be made to do so. If the temperature of the place where they are kept be raised by a stove, or otherwise, they will produce eggs. The fowls of the Irish peasantry, and of some of the Highland Scotch cottars, which are usually kept in the cabins of the owners, lay often in winter, in consequence of the warmth of their quarters. The fecundity of hens varies considerably. Some lay but once in three days, others every second day, and others every day. In order to induce laying, each hen should have its own nest, or nearly so, made with soft straw or heather, and furnished with a piece of chalk as a decoy or *nest-egg*. The signs which indicate when a hen is about to lay are well known. She cackles frequently, walks restlessly about, and shows a brighter redness in her comb and wattles. After the process of laying is over, she utters a series of loud and peculiar notes, to which the other fowls usually respond. Shortly after the egg is laid, it should be removed; for the heat of the hen soon corrupts it. When the eggs are taken away by the poultry-keeper, they should immediately be laid in a cool and dry place. If allowed to absorb damp, they soon spoil; indeed, one drop of water upon the shell quickly taints the whole egg. When the hens lay in a secret corner or covert, the keeper may sometimes discover it by placing a few grains of

salt in the oviduct, which hurries on the process of laying, and causes the animal to retire to the spot anew.

Various methods have been tried to prevent the absorption of air through the shell, and preserve the freshness of the eggs. Some keep them secluded from the air in bran, rye, or ashes, which may do very well where the eggs are to be kept in this way till eaten, but is utterly useless if quantities of them have to be sent to market. If the eggs are gently rubbed with fresh butter when newly laid, they will keep perfectly, and be as fresh for breakfast three months afterward as when newly dropped. Mr. Mollison says he has found the following, with less trouble, to answer the purpose even better, namely: "Place them in a water-tight cask, the small end of the egg down, and keep the whole always covered with a strong solution of lime-water."

Hatching.—When eggs are to be hatched, it is necessary to pay attention to the choice of proper ones for the purpose. Those too much pointed at the ends should not be selected. The eggs must also be fresh; from the time they are laid, they should lie aside in a cool place. It is said to be possible to ascertain, from the appearance of the egg, whether the forthcoming progeny is to be male or female; but this is doubtless a delusion. When eggs are left to be brought forth by the hen, a certain number are placed under her in the nest, when she is in the full inclination to sit. From nine to fourteen eggs are placed, according to the extent of the breast and wings; and the time required for hatching is about twenty-one days. Sometimes a hen will desert her eggs, a circumstance which may occasionally be traced to an uncomfortable condition of the skin, caused by vermin or want of cleanliness; and this affords a strong reason for keeping the hen-house clean, and giving the animals the means of purifying their feathers. Occasionally the hen is vicious, or, in short, a bad sitter, and experience in pitching on the best hatching-hen is the only remedy. Sometimes a hen will break her eggs with her feet; and in such cases the broken eggs must be removed as soon as observed, otherwise she may eat them, and from that be tempted to break and eat the sound ones, and thus spoil the whole.

It has generally been found that hens which are the best layers are the worst sitters. Those best adapted have short legs, a broad body, large wings, well furnished with feathers, their nails and spurs not too long or sharp. The desire to sit is made known by a particular sort of clucking note, and a feverish state ensues, in which the natural heat of the hen's body is very much increased. The inclination, or, as physiologists term it, the *storge*, soon becomes a strong and

ungovernable passion. The hen flutters about, hangs her wings, bristles up her feathers, searches everywhere for eggs to sit upon; and if she finds any, whether laid by herself or others, she immediately seats herself upon them, and continues the incubation.

With a proper provision of food at hand, warmth, quiet and dryness, a good hatching-hen will give little trouble, and in due time the brood will come forth; one or two eggs may perhaps remain unhatched or addled, but their loss is of little consequence. As soon as the hen hears the chirp of her young, she has a tendency to walk off with them, leaving the unhatched eggs to their fate. It is therefore advisable to watch the birth of the chicks, and to remove each as soon as it becomes dry, which may be in a few hours afterward. By this means the hen will sit to hatch the whole; yet she should not be wearied by too long sitting. If all the eggs are not hatched at the end of twelve or fifteen hours after the first chick makes its appearance, in all probability they are addled, and may be abandoned. It is a good arrangement to "set" two or more hens at the same time, so that in the event of only some half-dozen chickens from each nest, two broods can be taken charge of by one hen.

The chicks must be kept warm the first day or two. The food, given to the young chicks should be split grits, which they require no teaching to pick up; afterward, the ordinary food of the poultry-yard, or what the mother discovers for their use, is sufficient. Some give the yolks of hard-boiled eggs or curd when a nourishing diet seems advisable. The extreme solicitude of the hen for her young, or the brood which may be imposed upon her, is well known. She leads them about in quest of food, defends them by violent gesticulations and the weapons which Nature has given her, calls them around her by a peculiar low clucking cry, and gathers them carefully under her wings, to shelter them from danger, or to keep them warm at night. This maternal care is bestowed as long as the chickens require her assistance; as soon as they can shift for themselves, the mutual attachment ceases, and all knowledge of each other is very speedily lost. The young now go to roost, and the mother again begins to lay. Young hens, usually called pullets, begin to lay early in the spring after they are hatched. As heat is all that is necessary to develop the chick in the egg, eggs may be hatched artificially, without the intervention of the hen. The art has long been practiced in Egypt, and has since been adopted in many other quarters, but with indifferent success.

Where *Purity of Breed* is of importance, as when fowls are to be exhibited in prize competitions,

great care must be taken to keep the different kinds perfectly separate; otherwise intermixture to a certain extent is not undesirable. It is always, indeed, to be desired that each good kind be kept pure and in as great perfection as possible, for improvement of the stock. But even in a small poultry-house it is desirable to have different kinds, some being particularly estimable for their flesh, some for the abundance and quality of their eggs, some for their disposition to incubate, etc. For web-footed birds, free access to water is required; but some of the kinds are well enough provided for by a pretty capacious trough.

Capons.—By removing the reproductive and oviparous organs from the male and hen chickens respectively, a great change is produced in them as regards voice and habits, and they can be made remarkably fat for the table. Fowls thus operated on are called capons, and can be trained to watch chickens, hatch eggs, and do many useful offices of the poultry-yard. Upon the whole, however, the special benefit derived from rearing capons does not counterbalance the trouble which they give, and the danger of the primary operation; and the consequence is that the number of capons is decreasing.

Hens for Raising Eggs.—Hens to supply the table with eggs should be purchased in the spring, and care should be taken to procure young, healthy birds not over 18 months old. An old hen may readily be detected by her horny-looking legs, and her comb and wattles will look dry, not fresh as in young birds. If the hens be sound, they will almost immediately begin to lay, and continue until they molt in the autumn if they be well taken care of. Whenever a hen shows a desire to sit she must be prevented. A good plan is to invert a small cask, of which the head has been removed, upon three bricks. A hole being bored near the top for ventilation, this will make a capital pen for a "broody" hen, the food and water being placed just under the rim. A few days' confinement will take away all desire to sit from almost any hens but Cochins, which should not be kept on that account under the circumstances we are considering; and in about a fortnight the fowl, if not older than we have recommended, will begin to lay again.

Directly these hens stop laying in the autumn, and before they have lost condition by molting, they should, unless Hamburgs or Brahmas, be either killed or sold off, and replaced by pullets hatched in March or April, which will have molted early. These again, still supposing proper food and good housing, will all be producing eggs by November at furthest, and continue more or less. They may then either be

disposed of, and replaced as before, or, as they will not stop laying very long, the best of them may be retained till the autumn, when they must be got rid of. For if fowls be kept for eggs, it is essential to success that every autumn the stock be replaced with pullets hatched early in the spring. By no other means can eggs at this season be relied upon, and the poultry-keeper must remember that it is the winter which determines whether he shall gain or lose by his stock; in summer, if only kept moderately clean, hens will pay for themselves treated almost anyhow. The only exception to this rule is in the case of Cochins, Brahmas or Hamburgs, which will lay through the winter up to their second or even third year.

The stock to be selected, if a pure strain be chosen, are Hamburg or Spanish; either, in favorable circumstances, will give a plentiful supply of eggs, and give no trouble on the score of sitting propensities. The Spanish lays five or six very large eggs a week in spring and summer, but is not a hardy or free-laying breed for winter, and must have a warm aspect and perfect shelter from wind if the supply is to be kept up. Hamburgs are tolerably hardy, and are capital winter layers; they also produce more eggs in a year than any other breed, laying almost every day except when molting, and never wanting to sit; but the eggs are rather small. More than four or five Hamburgs should not be put in a shed, and they must be kept scrupulously clean.

Diseases of Poultry.—Among the diseases of poultry, *gapes*, is one which very frequently demands attention, particularly in young chickens. *Pip* or *roup* is another. Some of the maladies which cut off great numbers of young chickens, and still more of turkey-poults, may be in a great measure prevented by supplying abundance of nourishing and sufficiently varied food with water and lime; and by preventing the young birds, particularly turkeys, from getting among wet grass.

DUCKS.

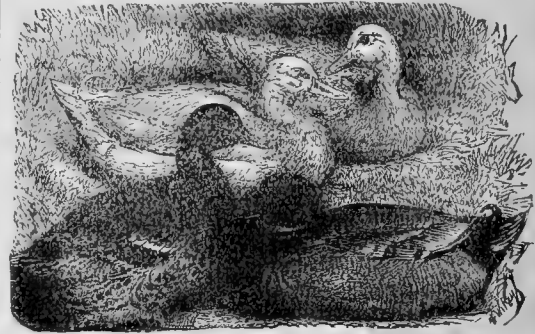
Ducks on the Farm.—Every year ducks are becoming more popular, and are receiving more and more attention, from the fact that, first, they are more easily reared than any other farm-birds; second, their feathers are valuable; third, the eggs and young ducks find ready sale in the markets; and fourth, the ducklings are the most active and indefatigable insect-hunters known. Market-gardeners who knew their value in this last respect would raise them if only as insect-destroyers in the fields.

Best Varieties for the Farm.—Where the principal objects are flesh and feathers, the white breeds are to be preferred; but where flesh only

is sought after, the Rouen and the Black Cayuga will be found satisfactory. As insect-destroyers, the Rouen ducklings rank highest among the large breeds, and the young of the common gray among the smaller. The Muscovy breed has really little in its favor but size, and even in this respect the Rouen, the Cayuga and the Aylesbury can compete with it, and are far superior as table-birds.

The Common White Duck is too well known to need description. It is not unlike the Aylesbury, except in size. The breed has fallen into disrepute since the introduction of the larger breeds, and is now seldom found pure.

The Aylesbury is the best of all the English breeds, and one of the most useful species introduced into the United States. They are not as heavy as the Rouen, but 18 pounds per pair is not uncommon. They are good layers, the eggs of pure white and thin in the shell. The Aylesbury is prone to fall down behind through the stretching of the abdominal muscles, and care should be taken in breeding to avoid such birds. When ducks are thus disabled they become sterile, and should be killed and dressed for market.



ROUEN AND AYLESBURY DUCKS.

Rouen Ducks.—The name of this breed would imply that they originated in the French town Rouen, but there is no evidence to that effect, and the term is probably a corruption of *Roan* duck. This variety evidently sprang from the Mallard or Gray duck, which in color and markings it closely resembles. The eyes, however, are more deeply sunken, and the ducks have the disability of the Aylesburys of soon falling down behind, the abdominal protuberance being early developed.

Black Cayuga.—This variety, of whose origin nothing is positively known, has been bred about Cayuga Lake for many years, and is one of the most celebrated of American breeds. They rarely rise from the water, and when on land seldom wander far, being too clumsy. They are rusty black, with a white band about the neck and white flecks on the breast; the drakes

generally have more white than the ducks, and the green tinge on head and neck is much more pronounced. In breeding select the darkest males, since they incline to breed white. They are prolific in eggs, laying from 80 to 90 in a season when well fed. The birds are hardy, and the flesh excellent, dark and high-flavored. If well fattened, they will weigh at six to eight months old from 12 to 14 pounds, and 16 pounds is not unusual. Being essentially a water-duck, they can only be profitably bred near lakes, ponds and streams.

The Muscovy—called also *Musk*, or *Brazilian*—ducks are large and handsome, the drakes frequently weighing 10 pounds and more. The color is a rich dark blue-black, with a white bar on each wing and more or less white about the head and neck. In the drake the feathers in the back are fine and plummy; the legs and feet are dark. But, as we said above, they have little to recommend them but their size, and they are neither hardy nor good layers. A characteristic by which they may readily be distinguished is the red membrane surrounding the eyes and covering the cheeks.

A Word of Caution.—It should be remembered in keeping ducks that the *wild* birds are monogamous, and not more than two or three given to one drake, if eggs are wanted for sitting. The duck usually sits well, and always covers her eggs with loose straw when leaving them, a supply of which should therefore be left by her. The usual number laid is fifty or sixty; but ducks have laid as many as two hundred and fifty in one year; and we believe with care this faculty might be greatly developed, and their value much increased as producers of eggs. At present they are mostly kept for table.

GEESE.

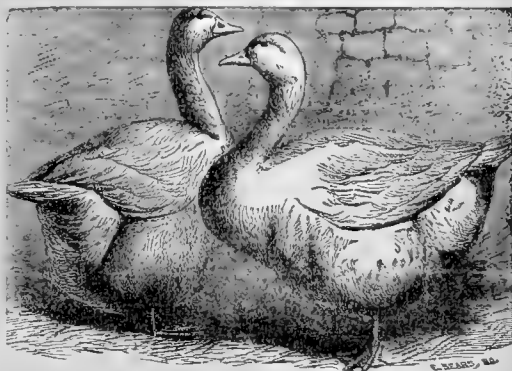
The two principal breeds of domesticated geese are the *Gray* or *Toulouse* and the *White* or *Embden*, concerning which we quote from an English authority:

"We very much prefer the *Gray* or *Toulouse* to the *White* or *Embden*, being larger and handsomer. We have had a *Toulouse* gander which weighed thirty-four pounds, a weight never, we are sure, attained by the *White* breed. They are also better shaped, as a rule, and every way the more profitable variety. The forehead should be flat, and the bill a clear orange-red. The plumage is a rich brown, passing into white on the under parts and tail-coverts.

"The *Embden* goose is pure white in every feather, and the eye should show a peculiar blue color in the iris in all well-bred birds.

"We should recommend for market to cross the *Toulouse* goose with the *White*, by which

greater weight is gained than in either variety pure-bred; but much will depend upon circumstances. *White* or cross-bred geese require a pond, but the *Toulouse*, with a good grass run, will do well with only a trough of water, and will



EMBDEN GEESE.

require no extra feeding, except for fattening or exhibition."

The only foreign varieties requiring mention are the *Chinese* and the *Canada* geese, both of which appear to be really midway between the geese proper and the swans, which they resemble in length of neck.

The *Chinese* goose is of a general brown color, passing into light gray or white on the breast, with a dark brown stripe down the back of the neck. The voice is very harsh and peculiar. This breed is not a good grazer, and is best reared in the farm-yard.

The *Canada* goose also is not a good grazer, and does best near marshy ponds, in which circumstances they will thrive and be found profitable.

General Management.—With regard to the general management of geese little need be said. Not more than four or five should be allowed to one gander, and such a family will require a house about eight feet square; but to secure fine stock three geese are better to one male. Each nest must be about two feet six inches square, and, as the goose will always lay where she has deposited her first egg, there must be a nest for each bird. If they each lay in a separate nest, the eggs may be left; otherwise they should be removed daily.

Geese should be set in March or early April, as it is very difficult to rear the young in hot weather. The time is thirty to thirty-four days. The goose sits very steadily, but should be induced to come off daily and take a bath. Besides this she should have in reach a good supply of food and water, or hunger will compel her, one by one, to eat all her eggs. The gander is usually kept away; but this is not very needful,

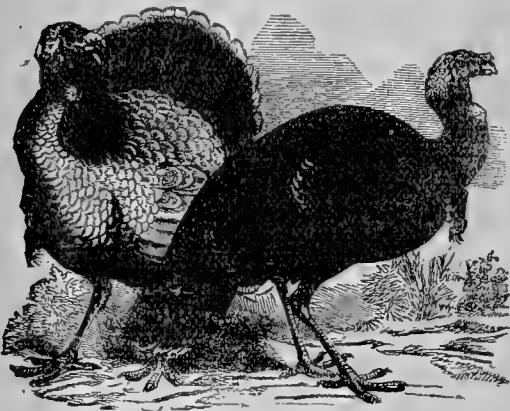
as he not only has no enmity to the eggs or goslings, but takes very great interest in the hatching, often sitting by his mate for hours.

The goslings should be allowed to hatch out entirely by themselves. When put out, they should have a fresh turf daily for a few days, and be fed on boiled oatmeal and rice, with water from a pond, in a very shallow dish, as they should not be allowed to swim for a fortnight, for which time the goose is better kept under a very large crate. After two weeks they will be able to shift for themselves, only requiring to be protected from very heavy rain till hedged, and to have one or two feeds of grain daily, in addition to what they pick up.

For fattening they should be penned up half a dozen together in a dark shed and fed on barley meal, being let out several hours for a *last bath*, before being killed, in order to clean their feathers.

TURKEYS.

The turkey has been domesticated for nearly three hundred years, yet still retains some of its wild habits, doubtless due to the fact that it will bear confinement less than any of the domestic land-birds. All varieties of turkeys, whether wild or domestic, breed together and continue fertile, proving that they had a common origin. Nearly every color is represented among them, black-bronzed and white-mottled being the original wild color. Some of the sub-species are the Common turkey; Black-and-white mottled; Black-bronzed; Mexican; White; Buff;



COMMON TURKEY.

Fawn-colored; Copper-colored; Parti-colored. Of these

The Black-Bronzed—said to have been produced by a cross of the Wild turkey upon the Common-turkey hen and improved by subsequent careful selection and breeding—is the largest, as it is the best, of the domestic varieties. They are hardy and of beautiful plumage, and will weigh when

mature, for average birds, about 30 pounds, while 40 has sometimes been reached by extra male birds.

The Common Turkeys are the most profitable to breed where only dollars and cents are concerned, as they are hardy, of medium size, little inclined to wander, and mature early. At eight months old they will weigh when fattened from 10 to 12 pounds, and at maturity 16 and even 18. In color they are white and black, mottled, having the head and wattle of the wild turkey.

English Turkeys; so called, are merely a sub-variety of the common American turkey, but careful breeding and selection have increased the size and rendered them quite uniform in color.

A Few Hints are here given to those who desire to raise turkeys. Turkey-cocks may be used for breeding at two years of age, and a hen at one year. The hen who is to sit should be good-sized; while the cock should have good shape and strength. The hen will lay an immense number of eggs. For this reason the first seven or eight eggs laid may be taken and put under a common hen; the turkey-hen will then have as many as she can well cover. May and June are the best months for hatching. The hen is very constant in her sitting, and she must be watched or she will not leave the nest to get her own food. She must also be kept quiet. Young turkeys are hatched in about 26 days, and as a usual thing they are very stupid about learning to feed. To help them two hen's eggs are often hatched with them, being put under the turkey three days later; and as the chickens will come out about the same time as the turkeys, they will very soon teach them how to eat. The food is much the same as for chickens; a little dandelion mixed with boiled eggs is found very beneficial, as it corrects the tendency to diarrhea which all young turkeys have. Great care must be taken of the young birds until they are 9 or 10 weeks old, when they will begin to "put out the red," as it is called, or to develop the singular red excrescences on the neck so characteristic of the turkey breed. This process will last some little time, and when completed the birds will be pretty fully fledged. They are now hardy, but must not be too suddenly exposed to rain or cold winds. Take some reasonable care of them for a while longer, and very soon they will have become the hardiest birds known in the poultry-yard, braving with impunity the fiercest storms, and even preferring, if permitted, to roost on high trees through the depth of winter. In fact, turkeys will rarely roost in a fowl-house; and a very high open shed should therefore be provided.

To attain great size, animal food and good feeding generally must be supplied from the first.

ARTIFICIAL POULTRY RAISING.

The saving of eggs is the first thing, and should be carefully attended to. First, handle with great care, and do not allow them to be too much shaken up. Secondly, place the eggs on end, and turn each egg twice a day. Then, when you have a sufficient number, place them in the incubator.

The Phenomenon of incubation has two principal factions controlling it, i. e., warmth and fresh air. Warmth being the stimulant to vital action of the germ, and pure air gives the oxygen necessary to make the chemical changes.

As to the proper lamp, only the safety lamp must be used. This should be made of an upper and lower chamber: the upper for the flame, and the lower for the wick. The moisture pan is now done away with in the modern incubators, and the machine supplies it itself.

How to Use Incubator.—When you have the right number of eggs in an incubator to suit you, place the eggs in the egg tray, then light the lamp and regulate, keeping the temperature at 102°. When lighting the lamp, turn up but a moderate flame and heat the incubator first. Then put the tray in the incubator when your temperature is regulated. After the second day the eggs must be turned twice a day. The unfertile eggs and dead germs should be tested. Always mark doubtful eggs and test again later.

In testing eggs, the simple method is a round telescope arrangement, at one end of which you place the egg and look through this tube, holding the egg at the further end and next to the light; then look through the egg at the light; if the egg is dark, it ought to have a chick, if clear, it is not fertile and it may be put back with the fresh eggs.

The room in which the incubator stands should be above ground, dry and well ventilated.

The Chicks.—About the twentieth day the chick has used up the entire nutriment in the shell, and being vigorous, wants to get out. The shell breaks first at the large end, being less moist and more brittle, and the head of the chick is turned there for air. The beak breaks through the shell on finding more air, and soon gets its freedom.

The chick starts in life with food enough for 36 hours, and should not be fed during that time, but should be kept dry and warm. To do this, the brooder is the best, hence we will turn to the brooder.

The Brooder.—The brooder should be kept at a heat of from 80 to 90 degrees; though the chick will run out into the cold, he must have a place to run into which is warm.

The best thermometer for the brooder, is the chicks themselves; if it is too hot they will scatter and sleep near the entrance; if too cold, they will

crowd together; and this crowding together with low temperature means bowel disease invariably as a result. Care in this is very necessary. The chick should for the first month have but little space outside the mother, giving it more range as it grows older.

Do not keep more than fifty chicks in a pen, and do not put chicks hatched by hen with incubator chicks; as one lousy chick will soon give vermin to the whole brood. Clean brooders daily, and if necessary, paint with kerosene to kill lice.

Feeding.—Chicks, like mature birds, have gizzards for grinding their food; and this fact would insure giving them hard food; but the best possible food for the first week is hard-boiled eggs, chopped up fine, shells and all, mixed with bread-crumbs. But first of all, do not over-feed. After the first ten days, wheat screenings, millet and cracked corn, Indian pudding, bran mash, oatmeal, and corn meal scalded with boiling water. A dish of crushed charcoal and bone meal is good.

Chicks need, too, good fresh water, food rich in nitrogen for muscle and bone, carbonaceous matter to make them fat and plump. At an age of two months, the birds ought to weigh two pounds.

Early Broilers.—If early broilers are to be raised, a large house divided into pens, six or eight feet wide, with runs outside the same width, and about twelve feet long, is the best method. Here brooders can be placed, and when the chickens are old enough these can be removed.

A dirt floor in this house is advisable, as rats are liable to infest a board-floored house. The chickens should be kept here until ready for market. But if kept during the winter, they ought to be allowed to run or to be kept in coops which can be moved from place to place. It is a fact that chickens confined after April do not do as well as though allowed to run. If confined longer, they drop off and lose appetite.

Don'ts.—Don't over-feed with too much animal food; the lack of grit gives crop-bound and bowel trouble.

Don't let the water get dirty.

Don't be afraid of green food.

Don't hatch late, i. e., in June and July.

Don't crowd the quarters, only allow those in a coop that can roost there.

Don't feed warm food in summer.

Don't fail to provide shade.

Prize Birds.—It is always well to keep fine birds; they are no more expensive than common ones, and every farmer should have one or two prize breeds, and take none else and keep these separate. He derives a two-fold benefit. He can put them in the shows and get his premium money, and can thus have a chance to sell his birds at high prices. Secondly, he can sell the eggs for sitting purposes, getting thus fancy prices.

DESCRIPTION OF BREEDS. HEAD, COMB, EAR-LOBES, AND BEAK.

In this description we use only the well-known breeds. Polish, Silkies, the different show Games, and other useless varieties that are ornamental, are omitted for the reason that they could not be sufficiently described here.

CLASS.	BREEDS.	EYES.	EAR-LOBES.	COMB.	BEAK.	HEAD — COLOR.
American	Plymouth Rocks	Bay	Red	Single	Yellow	Same as plumage
	Wyandottes, Silver	"	"	Rose	Horn	Silvery white, each feather having a black stripe to the point
	" Golden	"	"	"	Yellow	Golden white, each feather having a black stripe to the point
	" Buff and White	"	"	"	Black	Same as plumage
Asiatic	Dominiques	"	"	"	Yellow	"
	Brahmas, Light	"	"	Pea	Yellow, dark stripe	White
	" Dark	"	"	"	Dark Horn	Cock, white; hen, silvery gray
	Cochins, Partridge	"	"	Single	Yellow	Cock, red; hen, brown
Spanish	" Buff and White	"	"	"	Dark Yellow	Same as plumage
	" Black	"	"	"	Dark Horn	"
	Langshans, Black	Hazel	"	"	Bluish White	"
	" White	"	"	"	Yellow, dark stripe	"
Hamburg	Leghorns, Brown	Red	White	"	Yellowish Horn	Cock, reddish bay; hen, brown
	" Black	"	"	"	Yellow	Same as plumage
	" Buff and White	"	"	"	Dark or Black	"
	Minorcas, Black	"	"	"	White	"
Hamburg	Andalusians	"	"	"	Bluish	"
	Black Spanish	"	"	"	Dark Horn	Face almost entirely white
	Hamburges, Black	"	"	Rose	Dark	Same as plumage
	" White	"	"	"	Horn or Blue	"
French	" Golden Spangled	"	"	"	Horn	Bay
	" Golden Pened	"	"	"	"	"
	" Silver Spangled	Hazel	"	"	"	White
	" Silver Penciled	Red	"	"	"	"
English	Red Caps	"	"	"	"	Deep Red
	Houdans	"	"	V-shape	"	Same as plumage; has crest and beard
	Creyccours	"	"	"	Black	"
	La Fleches	"	"	"	White	Same as plumage
English	Dorkings, White	"	Red	Rose	White	"
	" Silver Gray	"	"	Single	Dark or White	Silvery white
	" Colored	"	"	Single or Rose	Yellow or Horn	Ashy white
	" Colored	"	"	Pea	Horn	Black
English	Games, Indian	Yellow	"	"	Deep Yellow	Red, carunculated
	Turkeys, Bronze	Hazel	"	"	Flesh Color	Creamy white
	Ducks, Pekin	Blue	"	"	Dark Yellow	Pure white
	" Rouen	Hazel	"	"	Dark Horn	Male, green; female, brown, with pale brown stripes
English	" Muscovy	Brown	"	"	Reddish	Black and white
	" Toulouse	"	"	"	Flesh Color	Dark gray
	Geese, "	"	"	"	"	White
	" Embden	Blue	"	"	"	"

NOTES ON THE ABOVE.

Combs of Leghorns and Plymouth Rocks should have 5 or 6 points (5 preferred). Spike on comb of Wyandottes should curve down, fitting the skull; spikes of Hamburgs should curve upward. Pyle Leghorns are omitted. Ear-lobes of Silvery Gray and Colored Dorkings should be red; but red is not imperative, as Dorkings are allowed more latitude than other breeds. Bronze Turkeys differ from Narragansetts in being bronze, the Narragansetts being black. Minorca combs should be large. Rose-comb Leghorns differ from the others only in having rose combs.

NECK, BACK, BODY, TAIL, LEGS, ETC.

BREED.	NECK.	BACK.	TAIL.	LEGS.	BODY, FLUFF, ETC.
Plymouth Rocks	Barred	Barred	Barred	Yellow	Barred, feathers being grayish white crossed with black
Wyandottes, Silver	Silvery white with black stripe	Male, silvery white, with black stripe; female, black with white centers	Black	Yellow	Male, under color black, white, white dusting, dusted-dark fluff; female, dark, with white centers, fluff dusted with white
" Golden	Dark Golden with black stripe				All parts same as Silver Wyandottes, except golden color in place of silver
" Buff and White	Plumage color	Plumage color	Plumage	Yellow	Plumage color
" Black	"	"	"	Black	"
Dominiques	Barred	Barred	Barred	Yellow	Same as Plymouth Rocks
Brahmas, Light	Hackle, white with stripe down feather	White, dark at the shoulders	Black	Yellow, heavily feathered	White, fluff white
" Dark	Hackle, silvery white, with black stripe	Silvery white, with black stripe; female, gray with penciling	Black	Yellow, heavily feathered	Black, peppered with white, fluff the same; female, gray with dark penciling.
Cochins, Partridge	Orange Red, with black stripe	Orange Red, with black stripe	Black	Yellow, heavily feathered	Male, black; female, brown, penciled with darker brown
" Black	Plumage color	Plumage	Plumage	Dark, heavily feathered	Plumage black
" Buff and White	"	"	"	Yellow, heavily feathered	Bufs are buff in color and Whites are white
Langshans, Black	"	"	"	Black, pink between scales	Black, the outer thighs and outer toes feathered
" White	"	"	"	Blue, pink between toes	"White
Leghorns, Brown	Red, with black stripe	Red, with black stripe	Black	Yellow	Male, black; female, brown ashy color
" Black	Black	Black	Black	Yellowish black	Black
" Buff	Buff	Buff	Buff	Yellow	Buff
" White	White	White	White	"	White
" Dominique	Barred	Barred	Barred	"	Barred
Minorcas, Black	Black	Black	Black	Black	Black
" White	White	White	White	White	White
Andalusians	Blue	Blue	Blue	Blue	Plumage is dark blue
Black Spanish	Black	Black	Black	Dark blue	Black
Hamburgs, Black	"	"	"	"	"
" White	White	White	"	"	White
" Golden Spangled	Red, with black stripe	Red, spangled with black	Blk and spangled	"	Red, spangled with black
" Golden Penciled	Deep Bay; female penciled with black	Deep Bay; female penciled with black	Black; female	"	Color, dark red, penciled below wings; female, dark bay, penciled over body
" Silver Spangled	White; female spangled with black	White; female spangled with black	White, spangled	"	Color, white with black spangles
" Silver Penciled	White; female penciled with black	White; female penciled with black	White; female	"	Color, white, penciled below wings; female, white penciled with black
Red Caps	Black, edged with red	Red and Black; female brown with spangle	Black	"	Body of male black; female, dark brown with black spangles
Houdans	Black and White	Black and white	Black and white	Black, 5 toes	Plumage is mixed black and white, black predominating
Crèveceurs	Black	Black	Black	"	Black
La Flèches	"	"	"	"	"
Dorkings, White	White	White	White	White, 5 toes	White
" Silver Gray	Black, with silvery hackle; female silvery white	Silvery white	Black; female dark-brown	"	Silvery gray, black stripe to hackle feathers

Classification of Breeds.—The breeds that are divided into varieties of different colors vary only in the difference of plumage, all being equal as layers, etc.

American Class.—*Plymouth Rocks.*—Barred, Buff and White. The Javas (Black, Mottled and White) are really about the same as Plymouth Rocks except in a few minor exterior points.

Wyandottes.—Silver, Golden, White, Buff, Black.

The American Dominiques, White Wonder and Jersey Blues also belong to the American class.

Asiatic Class.—*Brahmas.*—Light, Dark.

Cochins.—Buff, Partridge, White and Black.

Langshans.—Black, White.

All Asiatics have feathered legs, the Langshans not quite so much as the Cochins and Brahmas. The White Langshans are not regarded by some as very hearty, but the Blacks are excellent birds in every respect.

Mediterranean Class.—*Leghorns.*—Brown, White, Buff, Dominiques, Black, Silver Duckwing, Red Pyle. The Duckwing and Pyle are bred only as novelties, and are rare. There are also Rose-comb Browns and also of Whites, differing from other Leghorns only in having rose-combs.

Minorcas.—Black, White. There are also rose-comb varieties.

Andalusians.—Blue (really Blue Minorcas).

Spanish.—White-face Black. All of the Mediterranean class are non-sitters, and lay eggs that are white in color of shell.

Polish and Hamburg Class.—*Hamburgs.*—White, Black, Golden Penciled, Silver Penciled, Golden Spangled and Silver Spangled.

Polish.—Golden, Silver White, White-crested Black, Buff-laced, Bearded Golden, Bearded Silver and Bearded White.

Hamburgs and Polish are non-sitters, the eggs are white, and the Polish are more ornamental than useful. To the Hamburg class belong Red Caps and Campines, breeds that are not generally bred, as they lack in hardiness in this country.

French Class.—Houdans, Crève-cœurs and La Flèches compose the French class. They are non-sitters and excellent table fowls, but are not good winter layers as a rule.

English Class.—*Dorkings.*—White, Silver Gray and Colored. Dorkings are not prolific layers, but excel as sitters and for the table.

Game Class.—The Indian Game is the only one bred for utility. There are quite a lot of "fancy" Games, such as Black-breasted Reds, Brown Reds, Golden Duckwing, Silver Duckwing, Red Pyle, White, Black and Birchen. The Game Bantams correspond except as to size. Pit Games have no descriptions, as they may be of any color or size. It would require a large book to describe all the Games. All Games are sitters, and the eggs are nearly white in color.

Bantam Class.—Bantams comprise all the Game varieties to correspond with the large Games. There are also the following Bantams:

Cochins.—Buff, Partridge, White and Black. The class includes, other than Cochins, the Japanese, Polish, Booted White, Rose-comb Black, Rose-comb White, Golden Sebright, and Silver Sebright.

Miscellaneous Class.—This includes the Sumatras, Russians, Frizzles, Rumpless, Suttans and Silkies, which are bred only as novelties.

Sitters and Non-Sitters.—Of the above the Asiatic, American, English, Game, Bantam and Miscellaneous classes comprise sitters (except Polish Bantams), all other classes comprising non-sitters. All non-sitters lay eggs with very white shell.

Before the Show.—Begin six weeks ahead of time. Oil the legs, combs, wattles and beak with a gill of lard oil and teaspoonful of oil of pennyroyal. This will clean the legs. About two weeks before, feed sunflower seed at least twice a week. Wash the comb, wattles and legs with one part alcohol, two parts water.

About two days before you ship the birds it is well to wash them. This is done by heating a room up to about 100 degrees; then fill a tub half full of warm water, make a lather of castile soap, and put the male in first and wash him well, lightly at first, then harder as he needs it. Do not fear that the feathers will break, as when wet they will not. Wash from head to tail. When the dirt or stains are gone, place the bird in the rinsing-tub, which, by the way, should have a little cooler water than the first. When rinsed, place the bird in the coops which have been placed around a stove, and keep the temperature high.

When the birds begin to dry they will fluff up their feathers, and each will dry and assume its proper place. As the birds dry, let the fire die down, so as to have as little change in temperature as possible.

Pluck any false feathers before you ship. Also, before you ship moisten the comb with glycerine to keep them from freezing on the road to the show.

At the show, wipe off the glycerine after properly arranging them, get all the niceties you can for them. On the day of judging sponge their comb, head, wattles, etc., with alcohol half, and water half. Then apply oil of pennyroyal to beak, legs and toes, and wipe dry; if necessary to remove, scour with a brush.

For success in keeping poultry, four things are well to know: how to select the breed best adapted to your special desire, how to feed the fowls, what cleanliness is, and how to house the birds well.

Diseases of Poultry.—Dirt is a common cause of sickness; a damp location for your poultry-house is another cause, and improper drainage is very bad. All advise against a drafty hen-house, though do not have a stuffy house.

Don't let lice get in your houses.

A bad thing is to confine your birds, as it causes weak legs. Over-feeding is as bad as to under-feed. Don't give impure food or water.

It is always cheaper and easier to prevent disease than to cure it. Avoid dampness, keep clean, nice dry earth in your houses. Keep white-washed and well kerosened. Take out sickly fowls. Give good space to all fowls, and don't overcrowd. Have spare room for sickly ones:

A good mixture for fowls is one pound of copper dissolved in two gallons of water, adding one ounce of sulphuric acid. Keep in a corked jug, and give to fowls and chickens twice a week, one tablespoonful to a quart of water. It is sometimes best to get rid of the bird which is sick rather than try to cure it, especially if the disease is well set.

Chicken Cholera.—Cholera can be easily discovered by the fact, that the bird is excessively thirsty, has a slow staggering gait and a drowsy look. Then there is a diarrhea with a greenish discharge. The quickest and best way to cure this disease is to kill the bird lest the contagion spread. Bury the body deep, and go to work and disinfect your houses and yards. Do this by burning sulphur and alcohol, one pound of sulphur to a pint of alcohol. After this whitewash your house with lime. Put lime in your yards after cleaning it up thoroughly.

If you wish to save the bird the remedies are $\frac{1}{2}$ teaspoonful of castor-oil; feed warm cooked food, especially corn-meal worked into dough. After this give boiled milk with a little red pepper. Another remedy, powdered chalk, powdered charcoal, gum camphor and pure carbolic acid, and assafetida; mix equal parts, and give twice a day in food, one teaspoonful to ten fowls.

Diarrhea.—This is caused in fowls by the giving of too much green food, dirty quarters or unclean food. To cure, change their diet, give a pill of cayenne pepper, rhubarb, and powdered chalk, equal parts, and roll into a pill, wetting with camphor enough to moisten it.

Chickens ought to be kept warm, and should be fed on boiled rice, boiled milk and warm foods. If not cured in a few days give the pill mentioned for fowls.

Constipation.—Caused by too close confinement, or by being in-doors. Give to chicks $\frac{1}{2}$ teaspoonful of castor-oil and green food, and to fowls give one teaspoonful of castor-oil; also give green food and oyster-shells.

Roup.—This prevalent disease is simply an aggravated cold in the head. The symptoms are sneezing, hoarseness, watery eyes and a little watery discharge from the nostrils. The head later becomes swollen, and canker comes in the throat.

First, remove the fowl to a warm place. Sponge head with vinegar, and water equal parts. Give $\frac{1}{2}$ teaspoonful of castor-oil. Another good remedy is

a teaspoonful of lard, $\frac{1}{2}$ teaspoonful of pepper, mustard, and ginger, and mix with powdered rice into a pill, and give each fowl one. Then add bromide of potassium to the water for the whole of the fowls, about $1\frac{1}{2}$ grains for each bird.

Gapes.—This disease is caused by a small worm getting into the throat. The disease can be recognized by the fowl continually gasping for breath, or by trying to clean the throat. One way of curing is this: put the chick or fowl in a slatted box, invert it, and raise it a bit from the floor. Put a hot coal under it, but not red hot, and drop some carbolic acid on it, allowing the fumes to rise until the bird chokes and sneezes. Do not, however, let them choke to death. This will make the worms loose their grasp, and the bird can thus get rid of them.

Another good method is to put the fowls in a box, and drop in some powdered air-slack lime, so that the fine particles of lime will sift down among the chickens. The lime is thus inhaled by the fowls; coughing is the result, thereby expelling the worms. Another remedy is to run a feather down the chicken's throat, pulling it back and forth, thus loosening the worms.

Lice.—These are more easily prevented than gotten rid of. Lice are liable to come from the setting hen. When a hen is set, dust her with insect powder, keeping it out of her eyes, and about two or three days before the chickens are hatched dust her again. If, however, lice take possession of the hen-houses remove all the earth from the floor, wash the entire house thoroughly with kerosene and whitewash, being sure that the latter fills every crevice, put new earth on the floor, and make new nest boxes.

Scaly Legs.—This disease is due to small insects which burrow under the scales of the legs. They cause rough and scurvy legs; and this, being contagious, should be promptly attended to. The legs should be washed in carbolic soap-suds. Another remedy is a preparation of sulphur and lard, which is to be rubbed on, after which, dip the legs in kerosene-oil for a sufficient length of time for the oil to penetrate the scabs. Also wipe the roosts with kerosene-oil.

Molting.—During molting, which is a natural action and not a disease, it is best to feed the hens good nutritious food, and keep them too fat rather than too lean, expecting no eggs.

Feather-Eating.—This is a very harmful habit; and its causes are idleness, lack of animal food and green stuff. The only cure is forced exercise, which can be accomplished by covering the floor with straw, throwing grain amongst it, thus making them scratch for their living. Also give them plenty of green food.

Crop-Bound.—This disease is found when the crop is hard and swollen to twice its natural size, and is caused by the inability of the hen to pass

food into the stomach. One cure is to pour warm water down the throat, working the crop with the hand; afterwards give it a teaspoonful of castor-oil, still working it with the hand, and give the hen no food for a day. If this does not relieve it, make a cut about an inch and a half long in the top of the crop, being careful not to make any cross-cuts, lest a blood-vessel should be cut. Then remove the contents of the crop, taking out any obstructions there may be. Take three or four stitches in the incision, and give only soft, cooked food for a week, and no water for two days.

Pip.—This is a bony cap on the end of a hen's tongue, making it impossible for the fowl to pick up grain or corn. Eventually if it is not cured it will cause starvation. This can be easily cured by taking a knife, and on the under part of the tongue commence and peel off the cap from the back towards the front, being careful not to cut off the end of the tongue. This is a very effective cure.

To Prevent Hens from Setting.—Put the hen or hens in a roomy coop, separated from the rest, in which there are no boxes, and nothing but the roost. Put in for their company a very lively young rooster, and this will cure them. Another plan is to shut them up in a barrel as dark as possible.

How to Dress Poultry for Market.—This should always be done by killing the bird, bleeding it in the mouth or neck, and picking clean.

Do not attempt to stick poultry in the mouth unless the operation is clearly understood; for if this is not properly done the bird will only half bleed, and blood will ooze out each time a feather is plucked, thus spoiling the appearance of the bird for market.

All such poultry should be without food for at least twelve hours before killing that their crops may be empty.

Dry-pick the feathers, rather than scald them.

DUCKS.

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General Duck-Raising.—The public, only in the last few years, have awakened to the importance of the duck-raising interest in this country.

Formerly it was supposed to be of small proportions, as compared to the beef, pork and poultry product.

This industry, if we may so call it, is vastly on the increase year by year, and duck culture assumes a most important part in the fancier's business.

People within a few years did not think ducks were fit to eat; but the public is fast beginning to know the fact that a nice roasted duckling, of about ten weeks old, is ahead of any other kind of bird or fowl. Thus, this sudden popularity of the bird in our markets, the great demand for them by the people, and the profits that can be realized from raising them, led me to advise each and every farmer, and those people who have the room, to keep ducks, and in consideration of this I will take up duck raising by artificial means, showing forth experiences of different men in the business for the last 20 years.

The first thing to be remembered in raising ducks is the fact that it is no child's play; that the care of ducks and chickens means early hours and late ones. The closest application and confinement are necessary for at least six months in the year; and if one is afraid of hard work and soiling his fingers, do not let him go into duck-raising, for he had better stay where he is.

It is no occupation, as supposed, for little children,

girls or boys; but it requires the attention of a good, strong man.

Advantages of Ducks.—If the hen is confined, she will grow drowsy, lose her ambition, and spend the most of her time on the roost. However, with a duck this is just the opposite. She is constantly in motion, and continually keeps in exercise. She is satisfied in snow and ice, which is not true of the hen. She likes nothing better than to be out on the snow-bank during a thaw; she does not mind the cold, only wishing to keep her feet warm. Her feathers and coat of down keep her body warm in all kinds and conditions of weather. She does not like confinement, and would rather be in the cold than in the heat of the house.

This is mentioned concerning the duck to show the reader the nature, and the kind of a house to build for his ducks.

The first requisite is to keep the ducks' feet warm; for if they have cold feet it affects them as a frozen comb does a hen, namely, that it stops their laying.

In the arranging of the buildings the only things to keep in mind are, that they should be as warm as possible, dry as possible; with a view of always having room enough to lengthen out, in case you should wish to enlarge your flock.

A very good house is arranged so that a person should have as little walking to do as possible, and is built after this method, namely: that it is about

100 feet long and 20 feet wide. On one side, taking up about three feet in space, is a walk running the whole length of the house. The remaining space is divided into pens, separated from one another by lath or wire-netting; each one of these pens is entered by a door from this passage-way, giving access to each separate pen, thus enabling one to keep the different varieties separate. One or more of these pens may be given up entirely to setters if so desired.

On the side of the pen, next to the walk, there can be arranged boxes as nests, opening from the back into the walk by a board let down by a hinge, so that it does not necessitate the person going in the pens to collect the eggs; but by walking through the passage-way, and letting down the different boards, he can gather all the eggs there are.

Care, however, should be taken to arrange a

One of the most important points about ducks is, that they will not produce the proper percentage of fertile eggs if fed on hard food alone. The natural food of the ducks is purely vegetable and animal, and is obtained in swampy places. The duck has no crop like the hen, and is not so well fitted to thrive on hard food. It is essential also to feed ducks for breeding, and ducks for the market. One object is to make them weigh the more, the other is to give them material for egg supply.

It is always well to give the ducks, during the moulting-season, a complete and retired rest, giving soft feed and plenty of green food.

Aylesbury Ducks.—This is one of the best breeds of English ducks. Although they are more degenerate in size in this country, yet by careful selection in breeding, using only the largest and strongest birds, this tendency may be obviated. They are



SWANS.

slanting board on the top of these boxes arranged as nests, to prevent the birds from going on top of them.

The majority of people have the impression that ducks' eggs are unfertile unless there is water to bathe in. This, however, is a great mistake, as a great many fanciers keep their birds in confinement, giving only water enough for drinking purposes.

It has also been found that free range is unnecessary for the fowls, and that they do as well in confinement and better, than as though they were allowed to roam at large.*

The Mode of Feeding varies at different seasons of the year. In autumn and the winter months it is well to feed twice a day equal quantities of corn-meal, bran and potatoes; then about noon it is well to give dry food, such as corn, oats and wheat. About June first, however, it is better to decrease the amount of bran, and increase the amount of animal food and the quantity of meal.

not quite as large as the Rouen variety, although they so nearly equal them in this respect that they often weigh 18 pounds per pair.

Their plumage is of a pure white; and they are good layers, the eggs being pure white and of thin shell. They have flesh-colored bills, and legs of orange hue. They are oval in shape, with a broad, long back, full, round breast, strong wings and short straight legs. This duck is prone to fall down behind, by the stretching of the abdominal muscles, and care should be taken in breeding to avoid such birds. When ducks are like this, they should be killed and dressed for market, because they are liable to lay unfertile eggs.

These ducks commence laying in February and continue for about five months with two to three brief intervals. They are excellent foragers, and will return regularly at night to their home.

Rouen Ducks.—This breed of ducks, sprung from the Mallard or Gray duck, to which in color one sees

a close resemblance. It is like the wild duck with its weight increased. The plumage is very beautiful. The head is long, and in the dark is of a luminous-green color. The bill is long and broad, of a greenish-yellow hue, wider at the end than at the base; the neck is long and slender the same as the head, with a white ring on the lower part that does not quite meet in the back. The upper part of the back is ashy-gray blended with green. The breast is broad and deep; the body broad, long and deep. The wings are grayish-brown in color, blended with green also. The plumage of the thighs is gray; the legs and feet, orange with a slightly bluish tinge.

This breed of ducks does not come to maturity

Their eggs hatch well, the ducklings raise easily, and mature rapidly, and in six weeks are larger than any other breed. This makes them of excellent market value. They need no water, cannot fly or climb fences, and are easily restrained.

Cayuga Ducks.—This is an American breed, and has long been raised in the United States and Canada. They are entirely a water-duck, and seldom come on land.

The head is small and slender, the bill broad, short and dark. The plumage is metallic-black, with green reflections on the head and neck and wings; legs are dark, head of black. They are extremely hardy, early in maturity, prolific layers, and



MORNING BATH.

quite as early as the Aylesbury, but is prolific, laying eggs of a rather thick shell, bluish-green in color. They, too, are excellent foragers.

These have very good market value, the flesh being very delicate, and the birds are easily fattened. These, too, are apt to fall down behind.

Pekin Ducks.—This breed of ducks was imported into this country from China. They are very hardy, easily reared, excellent table fowl and good layers, while their crop of feathers is nearly as great as that of an ordinary goose. They are white in plumage and are very large, although not as large as the two former breeds just mentioned, although they seem to be on account of their feathers being loose and fluffy.

their flesh has a rich game flavor, but when dressed for market their skin is quite yellow.

They are not an advisable breed to raise on land; but in the vicinity of lakes, ponds and streams, they are quite practical and best to raise.

The Muscovy Duck.—The Muscovy duck is sometimes called the Musk, or Brazilian duck. They are large and handsome, the color being a rich dark blue-black with a white bar on each wing.

In the drake, the feathers in the back are fine and plummy, the legs and feet are dark, and they have little to recommend them except their being hardy and good layers.

A characteristic by which they may be easily distinguished, is the red membrane surrounding the



HATTY DUCK FAMILY.

eyes and covering the cheeks. They never quack, and are favorites with those who like eccentricities. Their flesh is good, and they may be said to be nearly equal in egg production.

The Mandarin Ducks.—These are a Chinese variety, and are common in this country. The head is a long crest pointing backwards, which can be raised or lowered at will; the color of this crest is green and purple on top, shading into a chestnut and green. The feathers of the back are brilliant light brown, and the under parts white or nearly so. The quills or secondaries are brownish gray, edged on the lower web with white. The bill is crimson, the legs a lightish pink, and the back black. The garb of the duck is much plainer, being a mottling of greenish brown, with grayish under parts.

About May the drake loses his conspicuous feathers, even his wings, fans and crest, and becomes very much like the female; in August he again assumes his fine clothing, and by September is in full plumage.

Management of Ducks.—A brood of young ducks in a garden would well pay their raising, merely as insect destroyers. When kept in confinement they are not as profitable as poultry, because they will consume more food and lay less eggs. Ducklings mature rapidly, and at six months old are ready for market.

It is better to set ducks' eggs under hens, cochins or brahmas, the brahmas being preferred. The breeding ducks should be kept in their yards in the morning until about 10 A.M. by which time they will have laid their eggs, after which they can have their liberty. It is a good plan to keep them laying all the breeding season, and to set their eggs under hens.

In setting hens, they should be given from 12 to 15 eggs; there should be sufficient water for the duck to bathe in, and food placed near at hand. The usual time for incubation is 28 days. When hatching, the duckling ought not to be disturbed for at least 24 hours, at the end of which time they are ready for their first meal, which should consist of hard boiled eggs and bread crumbs soaked in milk.

After 4 or 5 days old, give them oatmeal mixed with milk, and other warm food. They will feed on dirt, grass, and insects; it is a good plan to give them a run in the garden each day.

Ducks should be fed every night when they return from their foraging expedition, which will insure their regular return. When two months old, coarser feed may be given. All ducks are the heaviest and fattest in December. Later, as the breeding time approaches, they will become lighter, and on this account will they lay better.

In raising ducks by incubation, the method is the same as in raising chickens, except that the time of hatching is longer, taking 7 days more; in raising ducks, the incubator which has a nursery below the egg-tray is the one to use by all means, as removing the duckling from the trays so reduces the temperature of the incubator as to chill the remaining eggs. Forcing the bird to lay its eggs, reduces the vitality of the eggs, and hence a poor hatch of ducklings results.

It is absolutely necessary, in order to produce healthy, vigorous young ducklings, to have good breeding stock; for no living man can afford to breed from infertile stock. Another essential is the caring for the ducklings when hatched, and seeing that the breeder is not too warm, lest death follow from over-heating and over-crowding.

Special care should be taken of the sanitary arrangement of your house. All ducklings should be kept as clean and healthy as possible.

There is great necessity of feeding green food; and it is always well as rye comes the first in the season, to give it. One would be astonished to see how much green fodder ducks can make away with.

Care is one of the important features of duck-raising. It is especially necessary that all ducks should have a bounteous supply of water; they will consume and waste vast quantities, and the supply should be made as convenient and as great as possible. Shade is also absolutely necessary for the ducks.

Method of Dressing Ducks.—The process is very simple; all that is necessary is a chair and a large box and a few knives; one knife should be double-edged and sharp-pointed. For the bleeding, let the man take the bird between his knees, the bill held down with the left hand, and make a cut across the roof of the mouth just below the eyes. The bird should then be struck on its head in order to stun it, the man taking the bird in his lap, its head held down firmly between one knee and the box. He should then go to work as soon as possible, and have the bird well plucked by the time it is dead.

All feathers should be carefully sorted while picking; the wing and tail feathers and the pins thrown away, the body feathers with the down thrown into the box. Some of the pins cannot be taken out without tearing the skin, and these together with the down should be shaved off.

When the bird has been picked, it should be turned into a barrel or basket of floating ice; this will harden it so that its outline will be well preserved.

GEESE.

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The two principal breeds of domesticated geese are the Gray or Toulouse, and the White or Embden, concerning which we quote from local authority: "We very much prefer the Gray or Toulouse to the White or Embden, being larger and handsomer. We have had a Toulouse gander which weighed 24 pounds, a weight never, we are sure, attained by the White bird. They are also better shaped as a rule, and every way a more profitable variety. The forehead should be flat, and the bill a clear orange-red. The plumage is a rich, rich brown, passing into white on the under parts and tail coverts.

"The Embden goose is pure white in every feather, and the eye should show a peculiar blue color in the iris in all well-bred birds. White or cross-bred geese require a pond; but the Toulouse, with good grass around, will do well with only a trough of water, and will require no extra feeding, except for fattening or exhibition."

The only foreign varieties requiring mention are the Chinese and the Canada geese, both of which appear to be medium between the geese proper and the swans, which they resemble in length of neck.

The Chinese goose is of a generally brown color, passing into light gray or white on the breast, with a dark brown stripe down the back of the neck. The voice is very harsh and peculiar. This bird is not a good grazer, and is best raised in the farmyard. The Canada goose, also, is not a good grazer, and does best near marshes and ponds, in which circumstances they will thrive and be found profitable.

General Management.—The raising of geese is a very simple process, and can be made quite profitable where there are proper surroundings. They may be raised with only sufficient water for drinking; but it is better to have access to water if possible. No more than four or five geese should be allowed to one gander, and such a family will require eight feet square of space. To secure even stock, three geese are allowed to the gander. Each nest should be about two feet six inches square, and the goose will always lay where she laid her first egg. There should be a separate nest for each goose, and thus the eggs when laid can be left; otherwise they should be removed daily.

Geese should be set in March or early April, as it is very difficult to rear the young in hot weather. The time of hatching is between twenty to thirty-four days. Each goose should be induced to come off daily and take a bath; besides, she should have good food and water, or hunger will compel her to eat her eggs one by one. The gander is usually kept away, but it is not necessary as he has no grudge against the eggs or goslings.

Old geese make better mothers than young ones. The geese should be allowed to hatch out entirely by themselves. They should be fed on boiled oatmeal and rice, with water from a pond, and from a shallow dish; they should not be allowed to swim for a fortnight, during which time the goose should be kept under a very large coop. After two weeks they will be able to shift for themselves, except for being sheltered from severe rains, until they are fully fledged, and should be fed twice a day on corn.

When first commencing to lay, geese are apt to be irregular; but as they mature they will lay with more regularity, and will be worth a litter of from 15 to 25 before declining to sit.

Breeding-geese should be kept rather thin, and have free grass range. When breeding, the goose will remain upon her nest after laying; she should have a deep nest, soft and firm to sit upon.

Old geese are very apt to be ugly when they have goslings, and will very often destroy young ducks' chickens with a stroke of their strong bill. They should have their coops removed from other poultry to do away with this danger. Geese are peculiarly inquisitive birds.

Rats are to be especially avoided in the vicinity of geese, as they will devour young goslings or other young poultry if they have the opportunity. The fox is also an enemy of the goose, as well as the skunk and weasel. The building therefore in which geese are kept should be thoroughly protected from such torments.

The house for geese should be similar to that of the duck, and is not necessarily an expensive structure, but should be built warm and dry; when properly cared for, geese will generally have no disease whatever.

For fattening geese, corn meal and potatoes mixed into a thin mush is as good a food as can be given.

TURKEYS.

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Turkeys.—The turkey has been domesticated for nearly three hundred years, yet it still retains some of its wild habits, doubtless due to the fact that it will bear confinement less than any of the domesticated land-birds. Nearly every color is represented among them, black-bronzed and white-mottled being the common wild color. Some of the species are the Common turkey, Black-and-white mottled; Black-bronzed; Mexican; White; Buff; Fawn-colored.

The Black-Bronzed, said to have been produced by a cross of the Wild turkey upon the common Turkey-hen, by subsequent careful selection and breeding, is the largest, as it is the best of the domesticated land varieties. They are hardy and of beautiful plumage, and will weigh about thirty pounds, while forty is sometimes reached by some birds.

The Common Turkey.—The Common turkeys are the most profitable to breed where only dollars and cents are concerned, as they are hardy, of medium size, little inclined to wander, and mature early. At eight months old they will weigh, when fattened, from ten to twelve pounds, and at maturity sixteen and even eighteen.

In color, they are white-and-black mottled, having the head and wattle of the wild turkey.

English Turkeys, so called, are small and a sub-variety of the common American turkey, but cross-breeding and selection have increased the size and rendered them quite uniform in color.

Besides these breeds there is a Narragansett turkey; the White turkey; Black turkey; Buff turkey.

The General Management of Turkeys.—Those who understand the proper method of rearing turkeys, the appliances and the convenience, do not find it a hard business, and a very profitable one when properly managed. The first essential is, to know the habits of the fowl. Turkey geese may be used for breeding at two years of age and the hen at one year. Farmers are very negligent in this respect; the hen which you choose to hatch eggs should be of good size, as the hen will lay an immense number of eggs. The first eight or nine should be set under a good hen; and after that the turkey-hen will have as many as she can cover. May and June are the best months for hatching. The hen is very constant in her sitting, and must be watched or she will not get her own food; she must always be kept quiet. Many turkeys are hatched out in about twenty days, and as a usual thing are very stupid in learning to feed, so that it is a good plan

to put two or three hens' eggs to be hatched out with the turkeys' eggs, putting them in about five days later than when you set the turkey-hen, so that at least one or two chickens may come off with the brood of young turkeys, and thus teach them how to feed, which is the same as for young chickens. A little dandelion mixed with boiled eggs is found very good.

Great care must be taken of the little turkeys until they are nine weeks old, or until they commence to put on the red. Under no circumstances should they be exposed to the rain or cold. Take good care of them and they will become the hardiest breeds known in the poultry-yard, braving with impunity the fiercest storms, and even preferring to roost on high trees in the depth of winter. In fact, turkeys will rarely roost in the fowl-house, and therefore a very high open shed should be provided. They will not bear confinement at all well, and must have plenty of range in order to thrive. They are of a roaming disposition, and they are quite liable to do much damage in gardens and cultivated places and fields. It is always well to remove the turkey-gobbler from the flock before the hens commence sitting. Foxes, skunks, hawks, and crows are great thieves of eggs. Turkey-hens are good sitters, but sometimes uncertain; turkeys are very liable to steal their nests, being sly in their habits. It is therefore a good plan to decoy, in the places which are frequented by them, by placing nest-boxes in corners remote from intrusion, and in tops of trees where they are in the habit of roosting; it does not need to be an elaborate nest; it may be in a clump of bushes, or in fact any place that is secure from the driving storms, and which will act as a hiding-place for them.

In setting turkey-hens, they should not be set near together, as one clutch will be hatched before another, thus enticing one of the other setters to leave her eggs to take care of the young turkeys which she hears near by. As soon as the chicks peep through the shell, you will know it by a peculiar sound which the turkey-hen makes, as she does not make this noise at any other time. Care should be taken lest before you even suspect it, you have a large nest full of young turkey chicks.

Care of Young Turkeys.—Turkeys require no food for twenty-four to thirty-six hours after they are hatched out. They should be put with the mother in a pen, and fed practically the same food as you would feed young chickens; they should always

be fed four or five times a day. They should be confined in the pen for two weeks, until they are strong enough to follow the mother; for it is always the way with the mother to lead the young brood on long rambles among tall grass and green fields, thus tiring out the little chicks.

Essential care should be taken not to expose them to wet before being full fledged. Dew is very fatal to young turkeys before they are fully fledged, and it is always well to keep them in a covered shed. Sour-milk curds is an excellent food for young turkeys; after the first week or two, the egg and bread crumbs may be done away with, and corn meal mixed with skim-milk will take its place. Grass and other green food can be given at that time. Cayenne pepper should also be put in with the food. As the turkeys grow old, the amount of food may be decreased; and if there is no danger from dogs, turkey-hens may be left to select their own nests, and at the end of four months they will bring home with them a fine brood of young turkeys. When young turkeys commence to droop and appear sleepy and drowsy it is a sure sign that they have vermin, and it will be wise to examine your broods.

Shelter for Young Turkeys.—If a farmer wishes to have a fine crop of young turkeys as well as old ones, it is necessary for him to see that they are well sheltered at night. These shelters can be a shed, barn, or hovel, it makes no difference which. Most young poults up to six weeks' old should be kept in a small coop surrounded by a yard, boarded up about fifteen inches high. A very good method is, if the young poults do not come back at night, to have some one go after them, and very soon they will get into the habit of coming by themselves.

Roosts for Young Turkeys.—Turkeys are usually left to seek roosting-places on trees or buildings. This is a very bad practice, and should at all times be avoided. Roosting on trees causes the breast-bone to become deformed, especially in the early period of their life. Roosting on barns and other buildings is a very filthy habit, and no first-class farmer would permit it. It is well in locating a roost to put it on the south side of some building, thus protecting it from the winter colds; it should be high, and four or five inches in diameter; care being taken not to have one side under the other, but along in a parallel line about two feet apart. The advantages of this system can be easily seen in that you have access to your flock morning and evening where you can count them, and by putting a few carloads of manure underneath the roost, you will have a fine mass of composite nitrogen.

Crooked Breasts.—This is caused by a weak constitution, or by injury received from sitting upon small limbs of trees, and it also may be caused by

too much inbreeding; if this is the case, change either the gobbler or the hen. Birds having such deformities should be killed and sent to the market.

Fattening Turkeys.—Turkeys should always be sent to the market in the finest condition possible. The economy in feeding is to give the young turkeys all that they can digest of corn food up to the time they are killed for market. They should be fed morning and night, and should be put through a regular course for fattening. The first of October is the time to kill for Thanksgiving; it is also a first-rate plan to reserve the smaller birds for Christmas and New Year's market, and they will ninety-nine times out of a hundred pay for the long feeding.

The best food is old corn and warm meal; milk is also an excellent fattening food. The corn should be given plentifully, and a good way to do is to put it in a field of grass if possible, making long throws of corn so that the turkeys can help themselves.

Turkeys for Market.—In caging turkeys, it is well to spread the ground over with corn, placing a noose in the center, and when the turkey steps into this, pull it quickly and you have a turkey on the string; but, however, if you follow out our suggestion and have roosting-places the birds can be very easily caught at night. Prepare in a room, shed, or stable as many nooses as you have turkeys, hang up each bird by the feet as high as will be convenient for handling; then take a sharp-pointed knife and stick them in the mouth across the roof near the top of the back, thus penetrating the brain with the point of the knife.

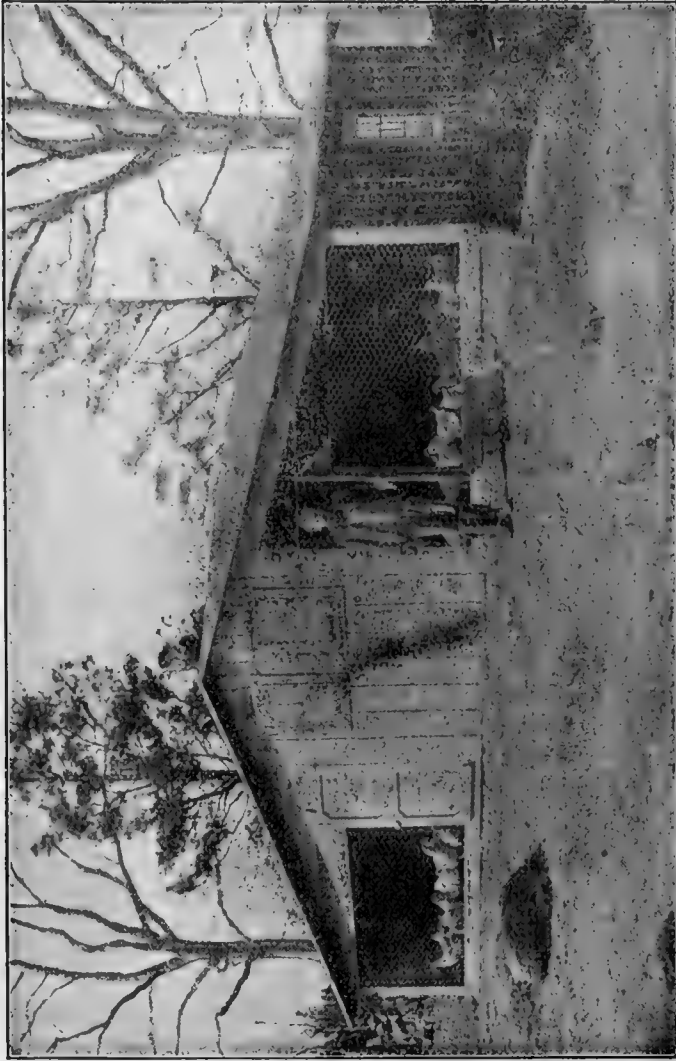
As soon as the bird is dead, pick clean of all pin-feathers, cut off the neck as near the head as possible, cut off the wings, and draw the crop and entrails.

The bird should be taken from this noose ready for market. It is also a first-class plan to put the bird, after dressing, on a table or clean board to cool off. In all circumstances great care should be taken not to break the skin, and not to leave any of the feathers on the birds.

In order to keep up your reputation as a turkey raiser, the bird should be as clean and as fine-looking as possible, and doing this will make a great difference, not only with your class of customers but also with the size of your bank-book.

The Profits of Turkey Raising.—The profit of turkey raising is very large, the outlay being comparatively small, as turkeys always command a good price in the market.

The one great secret for a large profit in turkeys is to take care of them and to look out for them all summer long, and do not think, "Well, let the turkeys take care of themselves, they are a good hardy fowl," because if you do this, you will let some of the smallest details go which are necessary in turkey-raising. Always watch the small ones, and the large ones will take care of themselves.



A MODEL CHICKEN HOUSE

Arranged for light and ventilation and to be easily kept clean ; also provided with nesting places easy of access

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IN EARLY TIMES.

Of all the arts essential to human life, that of agriculture is the earliest. The word originally means, cultivation of the field, but its practice began, even before the existence of anything deserving the name of a field, the first time a savage undertook in any way to assist Nature in the processes by which he expected his food. Long before written history, men had made great progress in the cultivation of the soil, and had succeeded in drawing results from the ground, in many cases such as would do credit to modern means of cultivation.

Egypt.—Bible readers will recall its frequent references to Egypt as a land so rich in corn, that it not only produced abundance for her own dense population, but yielded supplies for export. Diodorus Siculus bears explicit testimony to the

success of the farmers of ancient Egypt. He says they practiced skillfully the rotation of crops, and that they furnished to Rome an ordinary annual supply of corn of 20,000,000 bushels. He tells us that they fed their cattle with hay during the inundation, and at other times tethered them in the meadows on green clover. Their flocks were sheared twice a year, and their ewes yeaned as often. Remembering that Egypt is 600 miles long with an average breadth of 7 miles, its productiveness was wonderful.

Paintings and Inscriptions.—Many of these, after the lapse of two or three thousand years, retain the distinctness of outline and brilliancy of color of recent productions. These seem to give confirmation to the old saying, "There is nothing new under the sun." Those referring to rural affairs disclose a state of advancement at that early date which may well lead us to speak mo-

destly of our own attainments. An Egyptian villa comprised all the conveniences of a European one at the present day. Besides the mansion with many apartments, there were gardens, orchards, fish-ponds, game-preserves, with farm-yard, sheds for cattle and stables for carriage-horses. A steward directed the tillage operations, superintended the laborers, and kept account of expenditure and produce. In one painting, in which the sowing of the grain is represented, a plow drawn by a pair of oxen goes first; next comes the sower scattering the seed from a basket; he is followed by another plow; while a roller, drawn by two horses, yoked abreast, completes the operation.

Transfer of Egyptian Land.—The Egyptians attached great value to land, and observed the utmost formality in its transfer. In the time of the Ptolemies, their written deeds of conveyance began with the mention of the reign in which they were executed, the name of the president of the court, and of the clerk who drew them. The name of the seller, with a description of his personal appearance, his parentage, profession and residence, was engrossed. The nature of the land, its extent, situation and boundaries, and the name and appearance of the purchaser were also included. A clause of warranty and an explicit acceptance by the purchaser followed, and finally the deed was attested by numerous witnesses; and by the president of the court.

The Israelites, along with the Egyptians, Babylonians and Romans, rank as one of the great agricultural nations of antiquity. When they reached Canaan, the invading army of more than 600,000 men, with wives, children and camp-followers, found "old corn" in the land sufficient to maintain them from the day they passed the Jordan. To each of these 600,000 yeomen was assigned under an equal division from 16 to 25 acres. This land, held in direct tenure from Jehovah their sovereign, was strictly inalienable. The owners of these small farms cultivated them with great care, and rendered them highly productive. The soil was very fertile, and their diligence and skill kept it in good condition. The seventh year's fallow, and the burning of the weeds and spontaneous growth of the Sabbatical year, prevented the exhaustion of the soil. The crops chiefly cultivated were, wheat, millet, barley, beans and lentils, and probably rice and cotton. The hill districts and neighboring deserts afforded pasturage for numerous flocks and herds, and thus admitted of the benefits of a mixed husbandry. Not by a figure of speech, but literally, every Israelite sat under the shadow of his own vine and fig-tree; and the country as a whole is described as "a land of corn and wine, a land of bread and vineyards, a land of oil-olive

and of honey." Scripture agricultural allusions seem natural and appropriate to the modern farmer, and he can hardly hope greatly to surpass our Saviour's illustration of increase, "some thirty, some sixty, some an hundred fold."

Greece.—The Greeks conquered the soil they occupied, and contemptuously improved on the aboriginal tribes the labor of cultivating it, while they devoted themselves especially to poetry, philosophy, history and fine arts. But when we find that valleys were freed from lakes and morasses by drainage, that rocky surfaces were sometimes covered with transported soil, and that they possessed excellent breeds of the domesticated animals, which were reared in vast numbers, we infer that agriculture was better understood, and more carefully practiced, than the allusions to it in their literature would seem to warrant.

Rome.—While Roman arts and sciences, and general literature, were borrowed from the Greeks, they created an original literature of their own, of which rural affairs furnished the substance and inspiration. The reading of Cato, Virgil, Pliny and others turns up continually the very same subjects still handled controversially among us, so many centuries later. In ancient Rome each citizen received, at first, an allotment of about two of our acres, increased after the expulsion of the kings, to six. These small inheritances must, of course, have been cultivated by hard labor. Pliny says: "Virgil is of opinion that alternate fallows should be made, and that the land should rest entirely every second year. And this is, indeed, both true and profitable, provided a man have land enough to give the soil this repose. But how, if his extent be not sufficient? Let him, in that case, help himself thus. Let him sow next year's wheat-crop on the field where he has just gathered his beans, vetches or lupines, or such other crop as enriches the ground. For, indeed, it is worth notice that some crops are sown for no other purpose but as food for others, a poor practice in my estimation."

China.—Here agriculture is held in higher estimation than in perhaps any other country in the world. On the first day of each year, a grand ceremony is performed in its honor. The emperor, accompanied by his great officers of state, repairs to the sacred field, and, having offered sacrifice on an altar of earth, he traces a furrow with the plow, and his example is followed by princes and ministers. A like solemnity is celebrated by the governor of every province, who represents the emperor. The agricultural system of the Chinese is rude, but effective, and every inch of arable land is carefully cultivated. Spade-husbandry and irrigation are carried on

to a great extent. The Chinese have a strong perception of the value of night-soil as a manure; it is everywhere saved, bears a high price, and is collected in a manner highly offensive to European notions. In the northern provinces, the cereals are principally maize, barley, and wheat; but in the south, rice is raised in vast quantities, and forms the staple food of the people. Tobacco and the poppy are also raised in considerable quantities.

DEVELOPMENT WITHIN THE LAST CENTURY.

In *England and America* at the beginning of the 18th century agriculture was of the rudest kind. But a change was inaugurated just before the beginning of the present century, traceable more especially to the operations of the French Revolution. Still greater changes have taken place in the United States during the last half-century. Among the causes that have contributed to this result is the increased circulation of agricultural books and papers, written by intelligent and practical men, and more especially the invention and widespread use of so many labor-saving agricultural implements. Men not yet old can remember when all the operations of haying and harvesting were done "by hand," when the scythe and the cradle, the rake and the pitchfork, were all the aid the human brain had furnished for the securing and storing of hay and grain.

Improved Machinery and Tools.—The forerunner of the goodly fellowship of improved tools which reinforce the laborer's hand, was the clumsy wooden horserake. Within forty years reapers and mowers have come into general use; and with them seed and corn sowers, subsoil plows, cutters; cultivators; threshing and winnowing machines, and others of great utility. Farmers have been slow in giving up their old methods, and in welcoming new ideas. They rejected book-farming; their knowledge and their practices were traditional—they did as their fathers did before them. It takes a great while to educate the tillers of the soil up to a wise use of manures, and the application of chemistry to agriculture.

Agricultural Societies.—The formation of agricultural societies in almost every part of the country, in which men of education and influence have taken a lively interest, has helped to more skillful husbandry, to the better adaptation of crops to different soils, and to more remunerative work. It is hoped that the suggestions and information herewith given from practical sources, will be of service to farmers, as well as to many others who are interested, or may engage, in an honorable, and independent, and a lucrative employment

LAND-MEASUREMENT.

The unit of land measurement in the United States is the *acre*, of the same size as the English acre. Most nations have some measure approximately corresponding; originally, perhaps, the land one could plow in a day; so that uniformity is not to be looked for. The values of the more important corresponding measures are here given, compared with the English and American unit:

American and English acre.....	1.00
Scotch acre.....	1.27
Irish acre.....	1.62
Austria, joch.....	1.42
Baden, morgen or acre.....	0.89
Belgium, hectare (French).....	2.47
Denmark, toende.....	5.5
France { hectare (= 100 acres).....	2.47
arpent (common).....	0.99
Hamburg, morgen.....	2.38
Hanover, ".....	0.94
Holland, ".....	2.10
Naples, moggia.....	0.83
Poland, morgen.....	1.38
Portugal, geira.....	1.43
Prussia, little morgen.....	0.63
" great ".....	1.49
Russia, deciatina.....	2.70
Sardinia, giornate.....	0.93
Saxony, morgen.....	1.36
Spain, fanegada.....	1.06
Sweden, tunneland.....	1.13
Switzerland, faux.....	1.62
" Geneva, arpent.....	1.27
Tuscany, saccata.....	1.22
Württemberg, morgen.....	2.49
Roman jugerum (ancient).....	0.66
Greek plethron (ancient).....	0.23

The German morgen above are becoming obsolete, as the German Empire has adopted the French metrical system.

In Square Yards.—An acre contains 4840 square yards. The chain with which land is measured is 22 yards long, and a square chain will contain 22x22, or 484 yards; so that 10 square chains make an acre. The acre is divided into 4 roods, a rood into 40 perches, and a perch contains 30½ square yards. Engineers sometimes use, instead of a chain, a steel measuring-tape, 100 feet long, each foot divided into tenths. An approximate substitute may be made of a pole, 16½ feet long, cut by 24 notches at equal distances into 25 divisions.

In "*Government Land*," a township 6 miles square consists of 36 sections each 1 mile square. So that a section of 1 mile square contains 640 acres, a quarter section of half a mile square contains 160 acres, an eighth section half a mile one way by a quarter the other contains 80 acres, and a sixteenth section one quarter of a mile square contains 40 acres. In the government surveys the sections in each township are numbered 1 to 36, and the townships are numbered

from west to east, commencing at the northern border of the State.

In Square Feet.—An acre contains 43,560 square feet, so that 436 square feet are one one-hundredth of an acre, and so on. To some, it is easier to calculate each time from the measurement. Others may find assistance in tables. A field of any of these dimensions contains one acre:

5 yards wide by 968 long.		10 yards wide by 484 long.	
20	"	40	"
80	"	70	"
30	"	55	"
50	"	47	"
16	"	59	"

The side of a square to contain

One acre,	208.71 feet;	12.65 rods.
$\frac{1}{4}$ acre,	147.58 feet;	8.95 rods.
$\frac{1}{8}$ acre,	120.50 feet;	7.31 rods.
$\frac{1}{16}$ acre,	104.36 feet;	6.32 rods.
$\frac{1}{32}$ acre,	73.79 feet;	4.47 rods.

An English acre is a square of about 70 yards each way; a Scotch of $77\frac{1}{2}$ yards; and an Irish of $88\frac{1}{2}$ yards. Every mile of mere hedge and ditch is about an acre. Roads and fences, 1 rod wide, occupy 1 acre for every mile of length.

WATER.

An abundant and never-failing supply of water is of the very first importance to every successful farmer. Now and then a fortunate man can have access to copious springs in the right places, or can draw supplies from hills above. And others can lift water where wanted by a hydraulic ram. But the only resort often has to be, the old-fashioned well or pump. Now that the driven-well monopoly seems to have received its death-blow, water may in a great many localities be easily and cheaply made accessible through its means. But whether a driven pump or a dug well is to furnish the drinking-water for stock or men, the greatest care should be taken that a place be chosen free from the smallest danger of leakage or drainage into it of any impurity or defiled surface-water. How often does a farmer thoughtlessly use drinking-water which a stable, barn-yard, cesspool or other foulness may and does contaminate! And how often is the clergyman heard to lay at the door of an "inscrutable Providence" the loss of the father, the mother, the husband or the wife, who has died of the poison thus unwittingly taken into the system! Before you leave this paragraph, reflect whether this shoe pinches you; and if there is a shade of danger, "oh, reform it altogether."

FENCES.

What material shall be used for these necessary boundaries, must depend greatly on the locality and what is there accessible. Where land has become valuable, the old-fashioned rail

and 'Virginia fences' have to disappear. Before even these, how picturesque used to appear the long miles of overthrown stumps, the outstretched fingers of one interlocking with the outstretched fingers of its neighbor, and conjuring up to the boyish imagination in the gloaming weird shapes of Indians and of spooks! Sometimes no better use can be made of the stones which "grow" unplanted and unasked on a farm, than to make fence-rows of them. The writer remembers standing on a high hill near New London, Conn., where the eye, traveling in every direction, encountered only long miles of stone fence, no wood anywhere visible except an occasional gate.

The fence of the future seems destined to be of wire. Its cheapness and strength, and the little room it occupies, are continually drawing it into favor. Just back, we read that every mile of mere hedge and ditch occupies about an acre of ground. The wire fence occupies almost literally *nil*. An occasional club inveighs against the unsportsmanlike character of a wire fence. John Leech made pictures of hunting horsemen brought to grief over the invisible but strong barrier. Certainly, one may sympathize with the noble quadruped thus overthrown. But for the biped bestriding it, any latent feeling is qualified by the hope that every accident may help the downfall of such survivals as riding over cultivated fields and gardens in pursuit of vermin whose life an utterly absurd law preserves, that it may give opportunity for this very mischief.

The barbed-wire fence is coming into widespread use. Like the driven-well patent, the patent under which this fence is made has been vehemently attacked as a monopoly, and at its present status the case looks as though it will be found untenable. Where there must be a fence—and there are now a great many more than are needed—do let us have as little of it as will answer the purpose. How beautiful upon the fields and meadows shows the green growth clean up to the roadside, the passing eye wandering unobstructed, except by the infrequent post, and yet the growing crops as safe as behind an English hedge! At last, everywhere, utility and beauty may be expected to meet and mingle, and on that which serves its purpose best the accustomed eye looks with delight. Let us have our fences as infrequent as possible, and those that remain as near invisible as may be.

There is a certain picturesqueness and beauty about a well-kept hedge and ditch that please the eye. Suppose we compromise the matter and enjoy with our might what other people, and especially our English cousins, maintain at their own expense for public delectation. As a great poet remarks: "The stars are very well

where they are; I do not want them any nearer." Let us enjoy the hedges, but without thought of cultivating any such on our own land.

BARN.

According to the old legend, a good farmer will have a good barn, though he and his family have to live in a shanty. This may a little overstate the matter, but it is plain that if the farmer is to be dependent for his living on his stock and his products, whatever he neglect he must not neglect his products and his stock. Take care of them, even at the expense of the necessary sacrifice, and they will take care of him. But his barn and his home ought always to remain apart a little distance; if across the road, the better.

Every farmer thinks he can best plan his own barn: and this ought to be true. He needs, if he can get it, a side hill, so that he can drive loaded teams into the barn from the ground-level, and often he can embank an inclined plane from the opposite door, that the empty wagon or cart may be driven on and down and out, instead of having either to turn or to back out. Under his main floor he can easily contrive cow and ox stable, hay-press, storage room, and whatever else his special needs may require. There should be shafts through which food, etc., may be passed down from above, and good ventilation everywhere. His roof should project so as to have windows at the end which he may keep open and yet not wet his hay. Under or near his barn he should provide ample silos, in which he may preserve the ensilage that shall make his stock laugh and fatten the sides and pocket of owner and family. And there or elsewhere he should provide room where every vehicle and utensil he uses may be kept safely under cover and within walls. How "shiftless" to Aunt Ophelia seems the too frequent sight of wagons and carts in the sun and rain, the hay-rake and reaper and mower out of doors when not in use, and sleighs baking in the heat of summer—perhaps even harness hung in an open shed.

But even more shiftless than this is the waste of many a barnyard. How often does one see in such a place manure going to waste that would greatly increase the owner's crops! If a passage through many a barnyard is necessary in wet weather, how perilous and filthy the transit is! A great piece of water highly flavored with ammonia "and sich" sending up its perfumes, and "custards of Nature, pancakes of the earth," of all ages and consistencies, cover the ground, and foul the feet-coverings. The writer was once walking with the late Prof. Mapes by a heap of several cords. "That," said the professor, "is night-soil, treated with charcoal-dust,

and headlands." "Night-soil?—there is no smell." "No smell? I can't afford to let it smell; if there is any odor, my cash is evaporating." How much such wealth smells to heaven; and the resources which properly husbanded would give improved health, comfort and abundant opportunities for improvement, escape, foul the air, load the clothes and boots, pollute the persons, and threaten the health of the family in barn, yard or house!

FERTILIZERS.

Food of Plants.—The food of all plants is very much alike. The great mass of vegetables is resolved into carbonic acid, water and ammonia, on being subjected to heat or burned in a fire. It is these same substances which constitute the chief food of all plants. The light of the sun enables plants to decompose and assimilate carbonic acid and ammonia, and to manufacture out of them the various products they contain. All organic substances yield these by slow decomposition, as well as by combustion. It is for this reason that such substances increase the fertility of land when added to it.

Farm-Yard Manure.—This stands at the head of all fertilizers in common use. It consists of the excrements of stock, their litter, and the refuse of their fodder; usually first trodden down in successive layers, and partially fermented in the farm-yard, and thence removed and left in heaps where, by further fermentation and decay, it becomes a dark, moist, homogeneous mass. It is thus the residuum of the whole products of the farm, minus exported grain, and that portion of the other crops which, being first assimilated in the bodies of the live-stock, is sold in the form of butcher-meat, dairy produce or wool. In applying farm-yard manure to land, there is thus a returning to it of what it had previously produced, less the above exceptions, and such waste as gaseous exhalation or liquid drainage may cause during the process. Of course the value of the manure is dependent upon the richness of the food of the animals producing it, and the retention of its properties against exhalation and drainage. The richer the food upon which stock is fed so much the richer the manure produced. Stock fed upon straw and water leave a very inferior manure, that requires to be largely supplemented by other materials.

Liquid Manures.—The urine of all housed live-stock ought to be carefully retained, and absorbed in the solid matter of the manure-heap. Its surplus should be collected into a suitable tank, where it may be made available. English and Scotch farmers in general endeavor to have all the liquid excrements of the stock absorbed by the straw, and carried out in the solid form. But

often much more is produced than could be disposed of in this way. In a large farm near Glasgow the drainage of a dairy of 700 cows flows in a full continuous stream into a tank containing 30,000 or 40,000 gallons, whence an engine pumps it to various vats on the highest points of land to be irrigated. From these heights it is distributed where needed, miles of iron pipe being used in taking it up and down. But experiments on this scale are a matter more of interest than of use to our readers; and the profit of such operations, so conducted, is still a moot point.

Guano.—Next in importance to farm-yard manure, comes guano. This substance is the dung of sea-fowl, and is found on rocky islets in parts of the world where rain seldom falls. The droppings of the myriads of birds by which such places are frequented have in many cases been permitted to accumulate, during untold ages, and are now found in enormous deposits. The principal supply has hitherto come from the Chincha Islands, on the coast of Peru. Less than forty years ago a few casks were brought to Liverpool. In 1872 there were imported into Great Britain 118,704 tons, valued at £1,201,042, and in the same year into the United States 14,309 tons, valued at \$423,323; and 4209 tons, valued at \$60,865, were gathered from islands, rocks and keys belonging to the United States. The quality of guano varies greatly, but in good specimens there are 65 to 80 per cent of organic matter and fixed salts. The dung of birds, from its including both liquid and solid excrements, is superior as a manure to that of quadrupeds. On the grasses, guano is sown broadcast in the early part of spring, when vegetation begins to start. At this time the roots take it up and prevent it from being washed out of the soil. But clover, being a deep-rooted plant, is best dressed with it in autumn, that the roots may store up its active principles till spring, and the plants be in a more vigorous state for the next summer's growth. It is too soluble to apply to early autumn-sown wheat. In moist springs, when there are abundant rains to wash it in, it forms an admirable top-dressing for winter wheat. For spring-sown wheat and other cereals, no manure has a more powerful influence. The usual dressing is 300 to 400 pounds for cereals. The stronger the land the more may be profitably applied.

Domestic Bird-Manure.—Pigeon's dung has long been in high repute as an excellent fertilizer, and brought a high price in days when portable manures were scarcely to be had. It is now little heard of, guano, the excrement of fowls which feed upon fish, being superior, weight for weight. The manure of domestic poultry is usually mixed with the general heap, but it could be turned to better account if kept by itself. It has been re-

commended to strew the floors of poultry-houses daily with sawdust or sand, and to rake this with the droppings into a heap to be kept under cover and used like guano.

Night-Soil.—Baron Liebig is credited with the saying that an adult human being can be made to keep fertile an acre of ground. An untold quantity of fertilizing material thus produced is more than wasted every day. The products of the water-closet, both liquid and solid, should be deodorized and composted by mixture with dried peat, ashes or dry earth of a loamy nature. The privy vault or box should be easily accessible at all times, and ought to be kept well supplied with a mixture of these absorbents. No better fertilizer than this exists under the sun; about 10 bushels of the compost will be a good dressing for an acre. In China no other fertilizer is used, and about 400,000,000 of people exist on the crops nourished by it. The dry earth-closet introduced into England by the Rev. Mr. Moule, and the Wakefield closet in the United States, are most powerful auxiliaries of the agriculturist, and deserve the highest commendation.

Bone and other Manures.—The employment of bones as a manure is one of the greatest modern improvements in agriculture. They are applied either simply reduced to small fragments or a coarse powder called *bone-dust*, or, after undergoing chemical preparations of various kinds, as the basis of highly valuable artificial manures. All the substances which enter into the composition of bones are desirable additions to the soil, but particularly the phosphates. Phosphoric acid, usually found in combination with magnesia, and more particularly lime, enters into the structure of every plant and animal; it is a substance, therefore, which cannot be dispensed with either in the vegetable or animal economy.

Soda can be easily obtained in the form of common salt, but as this substance is usually associated with potash, the one is found in the dung-heap as well as the other. Common salt is applied to corn-crops that are growing too rapidly. The salt has the effect of stiffening the straw, and rendering it less liable to lodge. Salt is also used with great success in growing mangel-wurzel, as this is a plant which was originally taken from the sea-shore.

Potash is a substance most essential for all our cultivated plants; its market-price, however, is so high, that farmers seldom apply it directly to the soil. They employ certain crops, such as clover and turnips, to gather it up for them in the soil. These are consumed on the farm by cattle and sheep, and as little potash enters into animal tissues, as a permanent constituent, it is mostly returned to the dunghill in the excrementitious matters. Farm-yard dung thus possesses a value

of its own, by supplying this constituent, which cannot be bought economically in the market.

All perennial plants, such as grasses, are enabled to extract phosphoric acid from the soil more readily than annual plants, owing to their numerous and well-developed roots, which are ready, even at the beginning of the growing season, to draw supplies from a large mass of soil. Grasses, therefore, are only benefited by phosphoric manures when the soil is more than usually deficient in phosphates. If grass-lands are sterile, it is easy to ascertain if a deficiency of phosphoric acid is the cause, by adding calcined or crushed bone, and watching their effect. An experiment of this sort is a much better guide than any analysis of the soil.

The Enormous Waste.—John Stuart Mill, following his legal preceptor John Austin, prates of the "niggardliness of Nature." But the great source of human poverty is not any niggardliness on the part of Nature, but ignorance, neglect and laziness on the part of man. There are very few farms on which a scanty living is now made by hard work and rigid frugality, where a generous one may not be had, with less labor and more brains. In the single article of manures, fortunes go to waste yearly all over the country. As in any commercial business, it is not necessarily hard work that wins, though hard work is everywhere wanted; it is what the New Englanders used to call "faculty," gumption; old Dr. S. H. Cox called it "spizarinctum." The treasures that lie in ensilage were uncovered by a Frenchman of business; and yet how open they have all along lain! The mere judicious putting back into the soil of all waste and refuse matter produced from the soil, with judicious supplementing of the elements taken wholly away, is the secret. Bailey, in the "Book of Ensilage," says: "I am experimenting upon an old run-down farm, which, in 1877, could keep but 6 cows and one horse. I have now in my barn (Dec. 1, 1880) sufficient hay to keep 6 horses, and forage in my silos ample for the sustenance of 60 head of horned cattle, nearly 200 sheep, and 60 swine. I may also state, that during the past three years I have bought no hay or manure." This he lays to ensilage; but he saved his materials with jealous care as well as depended on ensilage.

CHEAP HOME-MADE MANURES.

Everything on a farm should be utilized; even the outflow of the kitchen-slops should be discharged on a bed of swamp-muck. Good wood-ashes weigh about 60 pounds to the bushel; of this $6\frac{1}{2}$ are soluble in warm water. They are worth to the farmer from 60 to 70 cents per bushel as a

fertilizer; if leached, they are worth perhaps a quarter of that sum. They are excellent for all crops, altogether unequalled for fruit-trees, and in a most unfavorable season 250 bushels of potatoes have been raised from 1 acre dressed with them.

Ashes from Soil by Spontaneous Combustion.—Make your mound 21 feet long by $10\frac{1}{2}$ feet wide. To fire, use 72 bushels of lime. First a layer of dry sods or parings on which a quantity of lime is spread, mixing sods with it; then a covering of 8 inches of sods, on which the other half of the lime is spread, and covered a foot thick, the height of the mound being about a yard. In twenty-four hours it will take fire. The lime should be fresh from the kiln. It is better to suffer it to ignite itself than to effect it by the operation of water. When the fire is fairly kindled, fresh sods must be applied; but get a good body of ashes in the first place. It may be fairly supposed that the lime adds full its worth to the quality of the ashes; and when limestone can be got, burn a small quantity in the mounds, which would be a great improvement to the ashes, and would help to keep the fire in.

Barn-Manure, Substitute for.—Dissolve a bushel of salt in water enough to slack 5 or 6 bushels of lime. The best rule for preparing the compost heap is, 1 bushel of this lime to 1 load of swamp-muck, intimately mixed; though 3 bushels to 5 loads makes a very good manure. In laying up the heap, let the layer of muck and lime be thin, so that decomposition may be more rapid and complete. When lime cannot be got, use unleached ashes—3 or 4 bushels to a cord of muck. In a month or six weeks overhaul and work over the heap, when it will be ready for use. Sprinkle the salt water on the lime as the heap goes up.

Manure from Large Bones without Expense.—Take an old flour-barrel, and put into the bottom a layer of hard-wood ashes; put a layer of bones on the top of the ashes, and add another layer of ashes, filling the space between the bones with them; then add bones and ashes alternately, finishing off with a thick layer of ashes. When your barrel is filled, pour on water (urine is better) just sufficient to keep them wet, but do not on any account suffer it to leach one drop; for that would be like leaching your dung-heap. In the course of time they will heat, and eventually soften down so that you can crumble them with your finger. When sufficiently softened, dump them out of the barrel on a heap of dry loam, and pulverize and crumble them up till they are completely amalgamated into one homogeneous mass with the loam, so that it can be easily handled and distributed when required. You may rely on it this manure will leave its mark, and show good results wherever used.

Fish-Compost, Substitute for Bone-dust, Manure from Fish-Refuse, etc.—The fish owes its fertilizing value to the animal matter and bone-earth which it contains. The former is precisely similar to flesh or blood, consisting of 25 per cent of fibrin, the rest being water; and their bones are similar in composition to those of terrestrial animals. As fertilizing agents, therefore, the bodies of fishes will act nearly in the same way as the bodies and blood of animals; 100 pounds, in decaying, produce $2\frac{1}{2}$ pounds of ammonia. Hence 400 pounds of fish rotted in compost are enough for an acre. The great effect is due to the ammoniacal portion; for it renders the herbage dark green, and starts it very rapidly.

Home-made Guano of Unequaled Excellence.—Save all your fowl-manure from sun and rain. To prepare it for use, spread a layer of dry swamp-muck (the blacker it is the better) on your barn-floor, and dump on it the whole of your fowl-manure; beat it into a fine powder with the back of your spade; this done, add hard-wood ashes and plaster of Paris, so that the compound shall be composed of the following proportions: dried muck, 4 bushels; fowl-manure, 2 bushels; ashes, 1 bushel; plaster, $1\frac{1}{2}$ bushels. Mix thoroughly, and spare no labor; for in this matter the elbow-grease expended will be well paid for. A little before planting, moisten the heap with water or, better still, with urine; cover well over with old mats, and let it lie till wanted for use. Apply it to beans, corn or potatoes, at the rate of a handful to a hill; and mix with the soil before dropping the seed. This will be found the best substitute for guano ever invented, and may be depended on for bringing great crops of turnips, corn, potatoes, etc.

How to Double the Usual Quantity of Manure on a Farm.—Provide a good supply of black swamp-mold or loam from the woods, within easy reach of your stable; and place a layer of this, one foot thick, under each horse, with litter as usual, on the top of the loam or mold. Remove the droppings of the animals every day, but let the loam remain for two weeks; then remove it, mixing it with the other manure, and replace with fresh mold. By this simple means any farmer can double not only the quantity but also the quality of his manure, and never feel himself one penny the poorer by the trouble or expense incurred, while the fertilizing value of the ingredients absorbed and saved by the loam can scarcely be estimated.

Twenty Dollars' Worth of Manure for almost Nothing.—If you have any dead animal—say, for instance, the body of a horse—do not suffer it to pollute the atmosphere by drawing it away to the woods or any other out-of-the-way place, but remove it a short distance only from your premises, and

put down four or five loads of muck or sods, place the carcass thereon, and sprinkle it over with quicklime, and cover over immediately with sods or mold sufficient to make, with what had been previously added, 20 good wagon-loads, and you will have within twelve months a pile of manure worth \$20 for any crop you choose to put it upon. Use a proportionate quantity of mold for smaller animals, but never less than 20 good wagon-loads for a horse; and if any dogs manifest too great a regard for the inclosed carcass, shoot them on the spot.

HOTBEDS.

The direction to use a hotbed occurs so often, in notices of half-tardy annuals, that we feel we shall be materially aiding those who are their own gardeners if we give a few simple directions on the subject of a hotbed composed of stable manure, the most frequent and useful form in which it is to be found.

The Preparation of the Dung is a matter of great importance, and if the bed be expected to retain its usefulness for any length of time it should be well worked previous to being used. If obtained fresh from the stable-yard, and found to be too dry, it should be well watered and thrown lightly together to ferment; this will take place in the course of a few days, and three or four days afterward it should be completely turned, well shaken and mixed, keeping the more littery portion to the interior of the heap; a second turning and watering may be necessary, although one will be generally found to be sufficient; when thus cleaned of its rankness the bed may be made.

The **Situation** for this should be dry underneath, sheltered from the north as much as possible and fully exposed to the sun; it should be built up from two feet six inches to four feet high, and wider by six inches every way than the frame to be placed upon it. The dung should be well shaken and mixed while being put together, and firmly pressed by the feet. The frame should be kept close until the heat rises, and three or four inches of sifted sand or ashes should be placed on the surface of the bed; in a few days it will be ready for use; but air should be given night and day while there is any danger from the rank steam, and if the sand or ashes are drawn away from the side of the bed they should be replaced.

When the hotbed is used for seeds only nothing further is necessary; they are to be sown in pots or pans, placed or plunged in the bed, the heat of which will soon cause them to germinate. As this will after some time decline, what are called linings should be added; that is, fresh, hot fermenting (but not rank) dung applied about a foot in width all round the bed; this renews its

strength, and will greatly aid its successful management.

A *Cold-Frame* is formed by placing the ordinary hotbed-frame upon a bed of light rich soil in some place in the garden where it will be protected from cold winds. They should both be shaded from the sun by mats during the middle of the day.

The frames may be made of common boards, with a post in each corner. The front should be enough lower than the back to give the needed slope to carry off rain. Cross strips should be put every three feet, strong enough to support the sashes. Sash-frames are easily bought, and ought to be of well-seasoned wood.

FOOD INGREDIENTS.—CHEMICAL TERMS EXPLAINED:

The *American Agriculturist*, Jan. 1879, contained the following:

Water.—If a piece of wood or wisp of hay be dried some time in a hot oven, more or less water will be driven off. The water in feeding-stuffs varies from 80 to 90 pounds in every 100 pounds of young grass or fodder-corn, to only 8 or 10 pounds to the 100 in dry straw or hay.

Organic Substance.—If the dried wood or hay be burned, most of it will pass off as gas, vapor or smoke. The part thus burned away is the organic substance. The residue—

The Ash—contains the mineral matters, that is, the potash, lime, phosphoric acid, etc., of the plant. The most important part for our present purpose is the organic, the combustible matter. This consists of three kinds of ingredients, albumi-

noids, carbo-hydrates and fats. The main point in economical feeding is to secure the right proportions of these at the lowest cost.

Albuminoids—also called *protein compounds*, *proteids* and *flesh-formers*—contain carbon, oxygen, hydrogen and nitrogen. Thus they differ from the carbo-hydrates and fats, which contain no nitrogen. The name albuminoids comes from albumen, which we know very well as the white of eggs, and it is found in milk. The fibrin of bone and muscle (lean meat) and the casein (curd) of milk are also albuminoids. Indeed, the solid part of blood, nerves, lean meat, gristle, skin, etc., consists chiefly of albuminoids. In plants they are equally important; plant albumen occurs in nearly all vegetable juices, especially in potatoes and wheat, casein or legumin in beans and peas, and fibrin in the gluten of wheat, the basis of what farmer-boys call "wheat gum." Clover, bran, beans, peas, oil-cake, and flesh and meat-scrap are rich in albuminoids.

Carbo-hydrates consist of carbon and hydrogen. The most important are starch, sugar and cellulose (woody fiber). They make up a larger part of the solids of plants, but only a little of them is stored in the animal body. Potatoes, wheat, poor hay, straw and cornstalks consist largely of carbo-hydrates.

Fats have more carbon than carbo-hydrates, and like them have no nitrogen. Fat meat, tallow, lard, fish-oil, the fat (butter) of milk, and linseed-oil are familiar examples of fats. Indian corn, oil-cake, cotton-seed and linseed are rich in fatty matters. [The last three are also rich in albuminoids.]

ENSILAGE.

Description.—This word is applied to a system of storing green fodder in vats, the invention of a Frenchman, M. Auguste Goffart, who ensilaged cut maize at Burtin, in France, in 1873. The vats or pits, or receptacles, in which the ensilage is made and kept, and from which it is fed out, are called silos. The crop most used now for the purpose is Indian corn or maize, though other growths are much used, and others still will probably be utilized. Bailey's "Book of Ensilage," 1880, reads: "A **SILLO** is a cistern or vat, air- and water-tight on the bottom and sides, with an open top; constructed of masonry or concrete. It may be square, rectangular, round or oval in shape, with perpendicular sides, used to store in their green state forage-crops, such as corn, sorgho, rye, oats, millet, Hungarian grass, clover and all the grasses. The forage is cut and taken direct-

ly from the field, run through a cutter which cuts it in pieces less than half an inch in length, and trampled down solidly in the Silo, and subjected to heavy and continuous pressure. The structure is the Silo, which may be above ground, or partly or entirely below the surface of the ground. The fodder preserved in Silos is Ensilage."

This description accords with the arrangements and processes introduced by M. Goffart, who built expensive stone structures, partly above and partly below ground, cut the fodder into small pieces, evenly spread the mass and covered it with a layer of straw; over the straw laid planks side by side as long as they could be without binding, and on these planks placed heavy weights. All this is, that the air may be kept out of the mass. The oxygen of what little air is packed in initiates the process of fermentation,

and a little carbonic-acid gas is produced. But if no further air is admitted, the fermentation is arrested, and the mass will remain indefinitely unchanged, retaining all its nutritious and succulent juices, with a slightly acid twang; and the resulting ensilage, care being taken to so cut it as not to admit air to the remaining mass, is eagerly eaten by stock, and with profitable results in the shape of flesh, of wool, of milk, of butter and of working power.

Ensilage is yet in its callow youth, but is attracting attention and coming into use. One enthusiastic adherent describes the discovery of Goffart as one "that is destined to confer a greater benefit upon mankind than any other that has ever been made." Mr. Bailey's book just quoted bears on its title-page, "How to produce milk for one cent per quart; butter for ten cents per pound; beef for four cents per pound; mutton for nothing if wool is thirty cents per pound." And a body of facts is gathering in newspapers and elsewhere of great value. The Department of Agriculture at Washington issued in July 1882 a pamphlet, "Special Report No. 48. Silos and Ensilage: a Record of Practical Tests in Several States and Canada." There have been held two "Ensilage Congresses," the last of them in January 1883, whose reports in pamphlet form are accessible. Mr. Bailey's book is very interesting reading. So is "Silos and Ensilage," etc., by Dr. George Thurber of the *American Agriculturist*.

George B. Loring, Esq., Commissioner of Agriculture, addressed, in June 1882, letters to various gentlemen asking from them answers to the following questions relative to silos and ensilage:

1. Location of silo with reference to feeding-rooms.
2. Form of silo.
3. Dimensions of silo.
4. Walls of silo—materials, and construction.
5. Cover.
6. Weight—materials used for, amount required, and how applied.
7. Cost of silo.
8. Crops used for ensilage.
9. Method of planting and cultivation.
10. Stage of development at which fodder is most valuable for ensilage.
11. Weight of fodder produced per acre.
12. Kind of corn best for ensilage.
13. Value of sweet corn as compared with field varieties.
14. Preparation of fodder for silo—machinery used.
15. Filling the silo.
16. Cost of filling per ton of fodder put in.
17. Lapse of time before opening the silo.
18. Condition of ensilage when opened.

19. Deterioration, if any, after opening.
20. Value of ensilage for milch-cows.
21. Effects of ensilage on dairy products.
22. Value of ensilage for other stock.
23. Quantity consumed per head.
24. Method of feeding—alone, or with other food.
25. Condition of stock fed on ensilage, both as to gain or loss of weight, and health.
26. Profitableness of ensilage, all things considered.

To these letters there are published ninety replies from twenty States, from which the following is generalized:

SILOS AND ENSILAGE: A SUMMARY.

The following is a summary showing the general drift of practice and opinion, on the several points enumerated in the schedule of questions, of those who have responded to the inquiries of the Department:

1. *Location of Silo.*—A few have been built at a distance from the stables, but generally the silos are located with reference to convenience in feeding, in, under or adjacent to the feeding-rooms. Local considerations will determine whether the silo should be below the surface, or above, or partly below and partly above. This is not essential. Where the stables are in the basement of a bank barn, the bottom of the silo may be on the same level, or a few feet below, and the top even with the upper floor. This arrangement combines the greatest facilities for filling, weighting and feeding.

2. *Form of Silo.*—With rare exceptions the silos described show a rectangular horizontal section; a few have the "corners cut off," and one is octagonal.

A given weight of ensilage in a deep silo requires less extraneous pressure, and exposes less surface to the air, than it would in a shallow silo. For these reasons *depth* is important. If too deep there is danger of expressing juice from the ensilage at the bottom. Where the ensilage is cut down in a vertical section for feeding, a narrow silo has the advantage of exposing little surface to the air.

3. *Capacity of Silo.*—The silos reported vary in capacity from 364 to 19,200 cubic feet. If entirely full of compressed ensilage the smallest would hold 9.1 and the largest 480 tons, estimating 50 pounds to the cubic foot. Practically, the capacity of a silo is less to the extent that the ensilage settles under pressure. This should not exceed one fourth, though in shallow silos, or those filled rapidly and with little treading, it is likely to be much more. A temporary curb is sometimes added to the silo proper, so that the latter may be full when the settling ceases.

4. *Walls of Silo.*—For walls under ground, stone, brick and concrete are used. In firm soils that do not become saturated with water, walls are not essential to the preservation of ensilage. Above ground, two thicknesses of inch-boards, with sheathing paper between (the latter said, by some, to be unnecessary), seems to be sufficient, if supported against lateral pressure from the ensilage.

5. *Cover.*—A layer of straw or hay will serve in some measure to exclude air, but is not necessary. Generally boards or planks are placed directly on the ensilage. The cover is sometimes made in sections 2 feet, or more wide; oftener each plank is separate. The cover is generally put on transversely, having in view the uncovering of a part of the silo while the weight remains on the rest. Rough boards, with no attempt at matching, have been used successfully. A little space should be allowed between the walls and cover, that there may be no interference as the settling progresses. (See *Remarks*.)

6. *Weight.*—Any heavy material may be used. The amount required depends on various conditions. It will be noticed that practices and opinions differ widely. The object is always to make the ensilage compact, and thereby leave little room for air, on which depend fermentation and decay. In a deep silo the greater part is sufficiently compressed by a few feet of ensilage at the top, so that there is small percentage of waste, even when no weight is applied above the ensilage. Screws are used by some instead of weights. The objection to them is that they are not self-acting, like gravity.

7. *Cost.*—The cost of silos, per ton of capacity, varies from \$4, or \$5, for walls of heavy masonry and superstructures of elaborate finish, and 50 cents or less for the simplest wooden silos. Earth silos, without wall, can be excavated with plow and scraper, when other work is not pressing, at a trifling cost. (See *Remarks*.)

8. *Crops for Ensilage.*—Corn takes the lead of ensilage crops. Rye is grown by many in connection with corn—the same ground producing a crop of each in a season. Oats, sorghum, Hungarian grass, field-peas, clover—in fact, almost every crop used for soiling has been stored in silos and taken out in good condition. There are indications that some materials have their value enhanced by the fermentation of the silo, while in others there is loss. The relative values for ensilage, of the different soiling crops, can only be determined through careful tests, often repeated, by practical men.

9. *Planting and Cultivation.*—Thorough preparation before planting is essential. Corn, sorghum and similar crops should be planted in rows. The quantity of seed-corn varies from eight quarts

to a bushel and a half for an acre. A smoothing harrow does the work of cultivating perfectly, and with little expense, while the corn is small.

10. *When Crops are at their Best for Ensilage.*—The common practice is to put crops into the silo when their full growth has been reached and before ripening begins. Manifestly, one rule will not answer all purposes. The stock to be fed and the object in feeding must be considered in determining when the crop should be cut. On this point must depend much of the value of ensilage.

11. *Yield of Ensilage Crops.*—Corn produces more fodder per acre than any other crop mentioned. The average for corn is not far from 20 tons—which speaks well for land and culture. The largest yield from a single acre was 58 tons; the average of a large area on the same farm was only 12½ tons.

12. *Kind of Corn Best for Ensilage.*—The largest is generally preferred; hence seed grown in a warmer climate is in demand.

13. *Sweet Corn for Ensilage.*—It is conceded by many that the fodder of sweet corn is worth more, pound for pound, than that of larger kinds, for soiling. Some hold that the same superiority is retained in the ensilage, while others think that the advantage after fermentation is on the other side. The sweet varieties generally do not yield large crops.

14. *Preparing Fodder for the Silo.*—The mowing-machine is sometimes used for cutting corn in the field—oftener the work is done by hand. Various cutters, having carriers attached for elevated silos, are in use and are generally driven by horse, steam or water power. Fine cutting—a half-inch or less—is in favor. It packs closer, and for this reason is likely to keep better, than coarse ensilage. Fodder of any kind may be put in whole, and, if as closely compressed as cut fodder, will keep as well, if not better; but it requires much greater pressure.

15. *Filling the Silo.*—During the process of filling, the ensilage should be kept level and well trodden. A horse may be used very effectively for the latter. Some attach much importance to rapid filling, while others make it more a matter of convenience. With the packing equally thorough, rapid filling is probably best.

16. *Cost of Filling the Silo.*—The cost, from field to silo, is variously reported; from 35 cents—and in a single instance 10 or 12 cents—for labor alone, to \$2 and upward per ton; though the higher amounts include the entire cost of the crop, not the harvesting alone. There is a general expectation that experience will bring a considerable reduction in the cost of filling.

17. *Time from Filling to Opening Silo.*—The ensilage should remain under pressure at least until cool, and be uncovered after that when wanted.

18. *Condition of Ensilage when Opened.*—In nearly all cases the loss by decay was very slight, and confined to the top and sides where there was more or less exposure to air.

19. *Deterioration after Opening.*—Generally the ensilage has kept perfectly for several months, showing no deterioration while any remained in the silo, excepting where exposed for a considerable time.

20. *Value of Ensilage for Milch-Cows.*—Ensilage has been fed to milch-cows more generally than to any other class of stock, and no unfavorable results are reported. There can be little doubt that its greatest value will always be found in this connection. Several feeders consider it equal in value to one third of its weight of the best hay, and some rate it higher.

21. *Effects on Dairy Products.*—There is a marked increase in quantity and improvement in quality of milk and butter after changing from dry feed to ensilage, corresponding with the effects of a similar change to fresh pasture. A few seeming exceptions are noted, which will probably find explanation in defects easily remedied, rather than in such as are inherent.

22. *Value for other Stock.*—Ensilage has been fed to all classes of farm stock, including swine and poultry, with results almost uniformly favorable. Exceptions are noted in the statements of Messrs. Coe Bros., and Hon. C. B. Henderson, where it appears that horses were injuriously affected. It should be borne in mind in this connection that ensilage is simply forage preserved in a silo, and may vary as much in quality as hay. The ensilage that is best for a milch-cow may be injurious to a horse, and that on which a horse would thrive might render a poor return in the milk-pail.

23. *Daily Ration of Ensilage.*—Cows giving milk are commonly fed 50 to 60 pounds, with some dry fodder and grain.

24. *Method of Feeding.*—Experiments have been made in feeding ensilage exclusively, and results have varied with the quality of ensilage and the stock fed. It is certain that ensilage of corn cut while in blossom, or earlier, is not alone sufficient for milch-cows. It is best to feed hay once a day, and some grain or other rich food, unless the latter is supplied in the ensilage, as it is when corn has reached or passed the roasting-ear stage before cutting. Ensilage, as it is commonly understood, is a substitute for hay and coarse fodder generally, and does not take the place of grain.

25. *The Condition of Stock fed on Ensilage,* both as to health and gain in weight, has been uniformly favorable.

26. *Profitableness of Ensilage.*—There is hardly a doubt expressed on this point—certainly not a dissenting opinion.

Remarks.—The general use of ensilage must depend largely on its cheapness. Costly silos and expensive machinery must always be insurmountable obstacles to a majority of farmers. For this reason, experience tending to show what is *essential* to the preservation of fodder in silos, is of the first importance.

Especial attention is invited to the *earth-silos* mentioned in the statement of Francis Morris, Esq., of Oakland Manor, Md. Mr. Morris is a pioneer in ensilage in America, his first silos having been built, and filled, in 1876. These were in the basement of his barn, walls of masonry. The next year he made a trench in sloping ground so that a cart could be backed in at the lower end for conveying ensilage to the feeding-room. The sides are sloping and the average depth does not exceed six feet.

The cost is simply the cost of digging a ditch of similar dimensions. This trench was filled in 1877 and regularly since, and has kept its contents perfectly. Mr. Morris has several silos of the same kind, in different places, for convenience in filling. He uses a large cutter driven by a steam-engine, and packs in the silo by treading with horses. The filling is carried several feet above the surface of the ground, and rounded up at the center, the excavated earth serving to confine the ensilage. The covering is first roofing-felt, then earth for weight.

Mr. Morris has put in whole fodder and it has kept perfectly. He cuts it fine, mainly for convenience in handling and feeding. Whole fodder should be laid across, rather than lengthwise in the trench, so that it can be taken out easily.

In order that the extent of Mr. Morris's operations may be understood, it is proper to add that his estate of Oakland Manor comprises about 1700 acres. His wheat crop last year (1882) was 5000 bushels. The meadows yield upward of 200 tons of hay annually. The stock consists of 50 horses and mules, 100 cattle, 500 sheep and 50 hogs. And as the whole is managed on business principles, Mr. Morris very justly esteems his earth-silos of primary importance.

We give a single specimen reply from the gentleman who translated Goffart's French work into English, and thus introduced the invention to the notice of the American public:

J. B. BROWN, 55 *Beekman St., New York City.*

The following answers are the sum of practical experience, collected from examination of many silos:

1. Preferably on sloping ground, so that the discharge-door may be on level with feeding-room, and so that a car may be used from silo to manger.

2. Oblong or elliptic, but not important.
3. Immaterial; but economy in depth.
4. Concrete is better than stone, which is liable to be damp; wooden walls above ground sufficiently strong to bear pressure, not necessarily air-tight; and do not need to be double, or lined; earth pits, well surface-drained, are in some soils as good as is necessary.
5. Immaterial, so that there be continuous pressure on the whole.
6. Whatever is cheapest; cord-wood, sacks of earth or grain, barrels of earth, casks of water, or stone.
7. From 20 cents to \$1 per ton of contents. Cheap silos preserve as well as expensive ones; it is only a question of durability.
8. Maize and grass for cattle; also rye, oats and peas for horses and sheep, even Caniada thistles and salt-meadow grass.
9. Corn, in double rows, space 2 or 3 feet; space between kernels in rows not yet settled.
10. Not, as the French advise, in the flowering, but to have the sweetest and greatest nutriment when the fruit is in the milk. This is a point of great importance. Must be careful to anticipate any fading of the leaves.
11. 86 tons of maize have been raised on an acre; 100 tons may be raised on an acre; average of good seasons, 40 tons; average of bad seasons, 20 tons.
12. Southern seed produces much the larger crops, and the more tropical the greater the growth.
13. Sweet corn, having been cultivated for the grain, is not best for ensilage, as the stalk is not large enough.
14. Three eighths to three fourths inch is best length to cut, and as keenly as possible, not shredded or mashed as is best for dry stalks. Cutting-machines should not be liable to injury from stones, and the revolving apparatus should not turn towards operator; elevators or carriers may be used to convey cut stalks to silo, and uncut stalks to feed rollers of machine, if it is important to economize labor.
15. Not important to be in a hurry when filling silo, except to save cost; if trampled every morning it will not heat sufficiently to injure it, even if the process of filling consume a month, with intervals of days.
16. Thirty-six cents per ton is the lowest cost as yet by hired labor; in this case the silo was convenient to the crop, and the machinery was powerful and efficient—strong engine and large cutter, with high speed.
17. Two months at least; the longer the better.
18. Always good when the crop is good, and when it does not get wet in the silo by leakage;

the silo improves the quality of the material by increasing its digestibility.

19. Does not deteriorate if the face is changed every day or two; 24 hours' exposure diminishes acidity.

20. Nothing so good as good ensilage.

21. Improves color of butter, increases quantity and richness of milk, where ensilage is good.

22. Oats, peas, and rye, or maize, in moderate quantities, for horses; also fattens sheep, and is economical for hogs, steers and bulls.

23. 25 to 75 lbs. a day, or 5 per cent of weight of animal; for horses $2\frac{1}{2}$ per cent is sufficient.

25. Good ensilage in proper quantities and varied with dry food at times makes healthy, thrifty animals; it must not be too sour; animals will fatten on it alone that cannot be fattened with hay or dry stalks alone.

26. For cows, steers, sheep and hogs it has been found, without exception, profitable; New England cannot do without it. It is a protection from drought in Nebraska and elsewhere; it is a safety from fire, grasshoppers and worms, and, more than all, is valuable in Texas.

At the *Ensilage Congress*, previously referred to, there were some two hundred in attendance; and the sessions occupied two days. The results reported are in general harmony with the tone of the replies received by the Commissioner of Agriculture. The Secretary of that Congress reports of it:

"At the *Ensilage Congress*, held in New York two weeks ago, invitations to which were sent, as far as known, to all the persons who had written about or knew practically anything about ensilage, no one in that room full of farmers could find anything to say against it, though urged to do so repeatedly, and to tell us of their failures; but all of them, millionaires and working farmers, anxiously sought an opportunity to pile up the testimony that this was no common blessing that had befallen the world. One of the most able speakers, in every sense, Le Grand B. Cannon, armed with exact figures, said: 'My profit from ensilage, in cost of feeding and in increase of product, over the old way, is 51 $\frac{1}{2}$ per cent.' This was the result with a herd of ninety Short-Horns. My own experience shows not only a larger percentage of profit, but that the system is adapted to the very smallest farmer. I have two cows on a piece of ground in New York City of four acres. A stony half-acre was covered with drought-killed sod. It cost me \$10 to get that half-acre plowed and harrowed by a neighboring contractor, \$1 more for a half-bushel of the best kind of Southern seed-corn. The rest of the work was done by the family horse and the gardener. That crop never saw a drop of

rain, and before it made any ears it began to fade; like a consumptive girl, it grew whiter day by day. But the silo was ready. It is made like a bin, single thick, not even matched, second-hand one-inch boards, in the cellar beneath the stable; cost, \$10. It will hold ten tons, but I had only half that amount. Dropped in from above, taken out from below. I was a week, purposely, in ensilaging that small crop; my two boys brought in the mowed stalks to the cutter in hand-carts, and trampled the silo each morning and night. It was cut one inch. It was very hot when the cover and thirty pounds of stones to the square foot were put on, but it cooled off very quickly; in twenty-four hours could feel that boards were cool. Every one is astonished to see how the cut maize shrinks under pressure, as it gives up its elasticity. The effect upon the milking cow (ten months) was to increase two pounds per day or ten per cent. It saved me two tons of hay, at \$20 per ton. Now you see from this that silos need not be air-tight; even the bottom of my silo is on sleepers, so that water could flow under it. Silos need not be filled rapidly. They need not be filled when the plant is full of juice, but as soon as convenient after ripening the juice, or after the pollen has fallen. The fact is, *cut stalks, under pressure, evenly spread, if no water enters, cannot fail to make good ensilage, whether under ground or above ground.*

"The French farmers found that you can take out of the silo something that you do not put in; and that is *condition*, or digestibility."

Numerous letters were read at this Congress, from gentlemen unable to attend, all attesting to similar results from the use of ensilage.

Great Advantages of Ensilage.—Mr. Bailey's book claims 40 to 75 tons as the product adapted to ensilaging which may be expected from an acre of ground. Mr. J. B. Brown: "86 tons of maize have been raised on an acre; 100 tons may be raised on an acre; average of good seasons, 40 tons; average of bad seasons, 20 tons." These claims sound large. But in an acre there are 43,560 square feet. An average of five pounds per square foot will add over 100 tons to the acre. Under favorable circumstances, and with proper manuring, the 100 tons may be approximated if not reached. But no such extraordinary yields per acre are needed to establish the advantage of ensilaging. The waste of food element, as far as man's use is concerned, which follows the process of evaporation, is enormous. From her exhaustless reservoirs Nature builds up in a few days from a single kernel of Indian corn a growth of from five to twenty pounds. Man may cut, secure and preserve it at its best, if he will. These juicy stalks and leaves which you must carefully fence your cattle away from lest they

gorge to repletion, you may keep almost as fresh and succulent, and quite as nutritive, through the winter as now, if you will. But if you don't take time by the foretop, Nature begins to reclaim what she so generously lent: to put back into her storehouses what man has been too ignorant or too unenterprising to lay his grasp upon. The curing hay, as it loses its juicy life, and turns into the withered corpse of its prime, salutes the sense of smell with its balmy breath; appealing on the side of fragrance as the exposed and bleaching barnyard or manure heap does on the side of malodor, against the human waste involved.

Conrad Wilson, in the article referred to under CATTLE, says: "The total yield of corn stover in its various forms is not less than 120,000,000 tons. It may be further added that if this entire product were converted into *milk*, under right conditions of feeding, it would amount to 60,000,000 tons, a year, which would be equivalent to 2100 pounds for each man, woman and child in the country. Strangely as this stalk crop has been ignored by the Census Bureau, it has none the less influenced, and for many years largely increased, the sum-total of milk, butter and cheese supplied by our farmers to the markets of the world." Perhaps Mr. Wilson is sanguine when he assumes a pound of milk to every two pounds of stover. At any rate, the added muscle, fat, milk, butter and cheese, which the now almost wasted juice of plants can be made to produce, would reach a sum absolutely staggering.

There are several considerations, aside from the economy of saving food otherwise wasted, pertinent in this connection. Mr. Wilson, in the article just quoted from, says: "Experience has already proved the possibility of keeping two cows on an acre under full feed throughout the year." Bailey claims that an acre may be made to keep four cows. Even if you halve the smaller estimate, there is an enormous gain. Shall not the labor of the stock in cropping its own pasturage during the pasturing months be saved? And the droppings, which the poet has apostrophized:

"Custard of Nature, pancake of the earth,
What gentle nymph presided at thy birth?"

What is their value spread singly over the pasture to be withered and pass into the atmosphere, compared with their value carefully preserved and composted? And in the winter, the ensilage retaining almost as much water as is needed by the stock, saves the animal heat required to bring the otherwise needed ice-cold water up to the temperature of the body.

It is not pretended that ensilage contains *all* the food-elements necessary to fatten stock and

to keep milch-cows in the most profitable condition. Other food must be given with it, and what that food should be depends on the composition of the ensilage, and on what it is fed for. Bailey proposes "to mix the concentrated nitrogenous grain, such as the refuse from flour-mills, wheat, rye or buckwheat bran, shorts or middlings, the refuse grains and feeding-stuff from breweries, or prepared animal food from fish or meat-scrap, such as Bowker's animal meal, fish-scrap prepared by Goodale's process or otherwise, with the green corn-stalks or other forage crops, at the time of ensilaging. For, while the ensilaging of green corn, rye and other succulent forage crops is an immense advance over the old system of curing forage crops by desiccation, and while such ensilage is a most excellent and succulent food for all domestic animals, still it is by no means a perfect food, being deficient in albuminoids; therefore it is necessary to add to the ration of ensilage a certain amount of concentrated nitrogenous food in the form of grain, or animal scrap-meal, or other concentrated cattle foods containing albuminoids to excess. Animals fed exclusively upon ensilaged corn will become fat, dull, heavy and lymphatic, the nervous and muscular systems not receiving that

degree of nutrition which they require for their full development." Whether there is any practical value in this suggestion we do not know, as we are not aware of any attempts to act upon it.

But if any reader who tills land and keeps stock has not become interested in the ensilage business, he had better investigate the matter, and learn if there is not a great deal in it for him too. The bugbear of large cost for masonry, etc., at the outset has disappeared; and any man can easily and cheaply experiment in the matter and note the result. There are fortunes in the mastery of this open secret, as there are in every direction in utilizing the gifts of nature. Wealth springs, not from the amount of resources that flows into one's hand, but from the amount of resources those hands utilize and retain. The man who could save for himself half the value of the coal that now passes off unused into the atmosphere, even with the best appliances, would have a richer place than Gould or Vanderbilt. And the farmers who shall intelligently retain the vital juices of their green crops, and transmit those juices into flesh, into wool, into milk and butter and cheese, will reap a large reward; and the rewards of those who go in early will probably be proportionally larger.

GRASSES.

Under this heading are included natural and cultivated grasses, and those other crops which are grown expressly for the sake of the cattle-food yielded by their leaves and stems. This kind of farm-produce is either consumed where it grows by depasturing with live-stock, or mown and given to them in a green state under cover, or dried and stored for after-use. There is no kind of soil which is not suitable to some or other of the grasses; and whilst some are peculiar to dry and sterile soils, others are only found on rich soils with abundant moisture; some grow in marshes, stagnant waters or slow streams, some only on the sea-coast; none are truly marine. Some grasses are annual, and some perennial; they have fibrous roots; the root-stock often throws out runners; the stems (*culms*) are round, jointed, generally hollow, except at the joints, rarely filled with pith, generally annual, and of humble growth, but sometimes perennial and woody, occasionally—as in bamboos—attaining the height and magnitude of trees. The leaves are long and narrow. The flowers are disposed in *spikelets*, and these again generally in spikes, racemes or panicles; they have no proper calyx nor corolla. Among

farmers, the term grasses is extended to include, along with the true grasses, other plants cultivated for fodder and forage, such as clover, etc., and these are distinguished by the term *artificial grasses*, whilst the true grasses are called *natural grasses*.

Botanists have divided the natural orders of grasses into the following tribes, of which the names of some of the more important are given as examples:

- Oryzææ.* Rice.
- Phalæææ.* Maize; Canary, foxtail, soft and timothy grasses.
- Panicææ.* Millet; fundi; Guinea grass.
- Stipeææ.* Feather grass; esparto.
- Agrostææ.* Bent grass.
- Arundææ.* Reeds; marrum grass; pampas grass.
- Pappophorææ.*
- Chlorææ.* Cord grass.
- Zizaneææ.* Oats; vernal grass; *aira*.
- Festuceææ.* Fescue; meadow-grass; manna grass; cock's-foot and dog's-tail grasses.
- Hordeææ.* Wheat; barley; rye; spelt; rye-grass; lyme-grass.
- Rottbelleææ.* Gama grass.

Andropogoneæ. Sugar-cane; shaloo or sugar-grass; durra, lemon-grass.

But the more important of these are usually ranged here as Cereals, or Cereal Productions. Under which latter heading the U. S. Census enumerates, Barley, Buckwheat, Indian Corn, Oats, Rye and Wheat. Under "principal vegetable productions" it ranges, Hay, Hops, Sugar-cane, Rice, Cotton, Tobacco and Potatoes. What are usually described under the word grasses, when not pastured, soiled or ensilaged, become Hay. Three of them will be mentioned.



RED CLOVER (*Trifolium pratense*).

Clover, or Trefoil.—This name is given to a large genus of plants which for the most part abound in temperate climates and offer most valuable



WHITE CLOVER (*Trifolium repens*).

a, head of flowers when the pods are ripening.

pasturage and fodder for cattle. From its three leaflets it derives its name Trefoil. The true clovers have herbaceous stems, roundish heads

or spikes of small flowers. There are several varieties, the most important of which is the *Common Red Clover*.

It is a biennial plant, but under certain conditions of cultivation becomes perennial. Land may be seeded down to clover with any of the cereals. The seed should be sown early, that it may get the benefit of spring rains. It should be cut after the dew is gone, as it holds the moisture, and must not be allowed to gather dampness after it is cut. Good clover-lands will bear two cuttings each season.

White Clover is adapted to pasture-land, and from its interlacing roots makes excellent turf for lawns.

Crimson or Italian Clover is much cultivated for hay and soiling, and also as a plant for borders.

Timothy or Herd's grass is said to owe its name to Timothy Hanson, who carried it to England from America about 1780. It is one of the leading grasses, perhaps the leading grass, of the United States, and is of great value for feeding cattle. It is a perennial grass, but springs up rapidly even in the year in which it is sown.

Red Top is another variety of grass much used for hay.

The proper time to cut the grass of meadow-lands is when it is in flower: usually in the middle or toward the end of June. In making hay, the standard to be attained to is dried green grass with a fine odor and flavor. The quicker hay is made, the better. Take care not to allow it to remain too long under the heat of the sun without being turned. Coarse grass does not require as much making as fine succulent herbage. Hay should never be housed if so moist as to heat or get burnt. The more of the juice can be retained in the hay and prevented from fermenting, or souring, or becoming musty, the better.

The Census returns the Hay crop of the United States:

	Tons.
1850.....	13,838,642
1860.....	19,083,896
1870.....	27,316,048
1880.....	35,205,712

New York State produced more than one seventh of the whole in 1880, 5,240,563 tons, or about 110 tons to the square mile. St. Lawrence Co. heads the list with 276,566 tons. But St. Lawrence contains more square miles than either Rhode Island or Delaware.



TIMOTHY GRASS
(*Phleum pratense*).

CEREALS.

Ceres, according to the old mythology, was the daughter of Saturn by Rhea, sister of Jupiter, Neptune, Juno, etc. Her father devoured her, along with other brothers and sisters, but afterward, under the influence of an emetic given him by Metis, threw her up. She became the mother of Proserpine, and had various adventures of no pertinence here, being, among others, the subject of a myth in which she became symbolical of the growth of grain. In her worship were held yearly, among the Greeks, the celebrated *Eleusinia*, at which were performed the famous *Eleusinian Mysteries*, the meaning of much of which still remains a mystery. Among the Romans her festivals were styled *Cerealia*. She is represented in a chariot drawn by dragons, having her head crowned with a garland of corn-ears, and holding a torch, a basket or a poppy in her hand. From her name is derived the word *Cereals*.

The *Cereal Grasses* are the plants which produce grain or corn; in other words, all the species of grass (*gramineæ*) cultivated for the sake of their seed as an article of food. They are also called corn-plants or bread-plants. They do not belong to any particular tribes of the great order of grasses, but differ from each other botanically, perhaps as much as any plants within the limits of that order. The seeds of the grasses in general being indeed farinaceous and wholesome, the employment of particular species as bread-plants seems to have been determined chiefly by the superior size of the seed, or by the facility of procuring it in sufficient quantity, and of freeing it from its unedible envelopes. Some of the grains, as wheat and barley, are produced in ears or close-set spikes; some, as a few of those called millet, in spike-like panicles; others, as oats and rice, in very loose panicles. The form and size of the grains vary not a little, some being roundish, and some elongated; maize is the largest; many of the millets are very small. The plants themselves vary in size almost as much as their seeds, the millets being the smallest, and maize the largest, of ordinary corn-plants.

Climates adapted to Different Grains.—The grains most extensively cultivated are wheat, barley, rye, oats, maize or Indian corn, millet and rice. Barley, oats and rye are the grains of the coldest regions, the cultivation of the two former extending even within the arctic circle. Wheat is next to these, and in the warmer regions of the temperate zone its cultivation is associated with that of maize and rice, which are extensively cultivated within the tropics. The millets belong to warm climates. Rice is the food of a greater

number of the human race than any other kind of grain. Maize has the greatest range of temperature. Some few other grasses are used as food here and there in different parts of the world, whose names may be omitted here. Of all the cereals, wheat is by common consent admitted to be that of which the grain is best fitted for the making of bread, although others are to some extent employed for this purpose. But some, as rice and maize, are scarcely suited for it, and other methods are chiefly employed of preparing them for food. All the grains are also used to produce some kind of fermented liquor or beer, and spirituous liquors are obtained from them by distillation.

Wheat.—For the successful cultivation of wheat a mean temperature of at least 55° Fahr. is required for three or four months of the year. The cultivated varieties of wheat are very numerous. Besides being classed as bearded and beardless, the varieties are distinguished by the color, as red and white wheats. The red varieties of wheat are usually more hardy than the white, but the grain is inferior and yields less flour. Red wheats are more cultivated where the soil is poor. When the climate is moist, a light soil is most suitable. Spring wheat is sown and harvested the same year. Wheat is often sown after green crops. It may be sown late in autumn when the ground is very moist, and when other grains would perish. It remains dormant in the ground during the winter, ripens in the spring, and is reaped in the early summer. It is either sown broadcast or in drills.

The wheat-fields in the eastern part of the United States are usually manured with farm-yard or other manures. In the West the farmers are saved the expense of enriching their wheat-fields. Wheat ought to be reaped before it is dead ripe, unless intended for seed. The value of wheat depends upon the quantity of fine flour it contains. The greater part of the husk of wheat is separated from the flour, and is called bran. The average yield in England is said to be 36 bushels to the acre. The Census of 1880 gives the production of wheat as 459,483,137 bushels, raised on 35,430,333 acres, an average of less than 13 bushels to the acre.

Spelt Wheat is considered as a distinct species from common wheat. It is of little value compared with many other kinds, but is much cultivated where coarse flour is used. Lesser spelt, which is one-grained, and is often called *St. Peter's corn*, is grown on poor soil. Spelt wheat is almost unknown in the United States; is sup-

posed to be native of countries near the Mediterranean, and is cultivated considerably in Switzerland and Germany.

Wheat suffers from the ravages of numerous species of insects, as the Hessian fly, wheat-fly, corn-moth and wire worm. Diseases caused by the presence of parasitic fungi are common. *Bunt*, or *smut*, is one of the most common varieties of disease. It is now thought to be caused by the decay of wheat, or by manure in which infected grain-straw has been mixed. It is best prevented by carefully cleansing the seed, and even dressing it before sowing with some substance which, without destroying the vitality, destroys that of the spores of the fungus. Flour made of wheat affected by smut is peculiar in taste and dark in color.

According to the Census of 1880, Illinois led off in the production of wheat with 51,110,502 bushels, followed closely by Indiana with 47,284,853, and Ohio with 46,014,869. In 1850, Pennsylvania led off with 15,367,691 bushels, followed by Ohio with 14,487,351, and New York with 13,121,498. In 1860, Illinois led with 23,837,023 bushels, followed by Indiana with 16,848,267, and Ohio with 15,119,047. In 1870, Illinois led with 30,128,405 bushels, followed by Iowa with 29,435,692, and Ohio with 27,882,159. Illinois produced in 1880 almost as much wheat as in 1860 and 1870 combined.

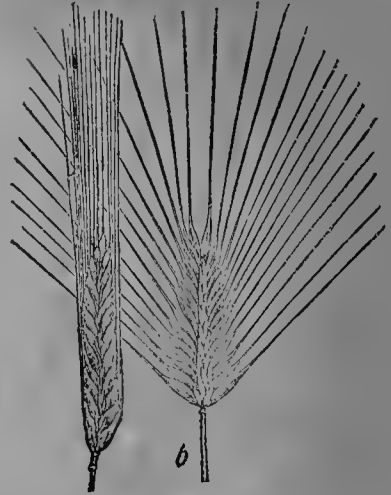
In 1850 the wheat product of the country was a little under five bushels of wheat for each person; in 1880 it exceeded nine.

Rye.—A cereal much cultivated in regions too cold for wheat, and on soils too poor for any other grain. Some varieties are best suited for autumn sowing, others for spring. Winter rye is extensively cultivated, being the most productive. The straw of rye is often of more use than the grains, and so care is shown in cutting and threshing. As green rye is good for fodder, it is often cut and kept for use. The grains of rye when roasted are a substitute for coffee. The meal made of rye is dark and somewhat coarse, but used by the peasants of Northern Europe in bread. New England brown-bread is made of rye and Indian-corn-meal. Rye is much used for fermentation and distillation, particularly in making gin and whisky.

The product of rye in the United States in 1880 was 19,831,595 bushels.

Barley.—This grain is cultivated more or less all over the country, being adapted to hot and to cold climates. The product in 1880 was 43,997,495 bushels, of which California produced 12,463,561. Its principal use is as a basis of malt, in the production of beer, ale and porter. Thousands who are connoisseurs in the flavor of the last-mentioned beverages, are entirely ignorant

of the taste of the natural barley-grain. This cut, showing heads of two kinds of barley, will



BARLEY.

a, two-rowed barley; b, sprat or battledore barley.

awaken no recognition in many a man to whom the stanza

“But the cheerful Spring came kindly on,
And showers began to fall;
John Barleycorn got up again,
And sore surprised them all.”

will recall the whole of Burns's famous ode.

Millet is rarely cultivated in this country for its seed, but is raised in small quantities for green or dried fodder. The Hungarian millet or grass is the most satisfactory variety.

Oats.—A valuable cereal adapted to a moist and cold climate. They are used mostly as food for horses, and to a considerable extent as human food in the shape of oatmeal or grits. There are many varieties in cultivation, and new ones are being introduced. A popular variety is the *potato-oat*. Oats should be sown early in the season, as heat checks their growth. They are generally a paying crop to the judicious farmer.

The production of this grain in the United States is very large, following in the third place after Indian corn and wheat. The last Census returns the acreage of oats in 1880 as 16,144,593 acres, and the product as 497,858,999 bushels, an average of about 25 bushels to the acre. Indiana leads with 63,189,200 bushels, followed by Iowa with 50,610,591, and New York with 37,575,506.

The Wild Oat, although used in some countries for food, is generally regarded as a weed. “Its panicle spreads equally on all sides, the outer palca are merely bifid, and there are long hairs at the base of the glumes.” Its seed is sometimes used as an artificial fly for catching trout, but whether the trout were taken by it is not recorded. These oats should not be confounded

with the variety so often foolishly sown by young people, on crowded pavements as well as on rustic fields, and which are always weeds.



WILD OAT (*Avena fatua*).

Indian Corn, or Maize.—Dr. Sturtevant, in the *Massachusetts Ploughman*, tells us: The corn-plant is only known as a cultivated plant. When Columbus first reached the shores of the West Indies in 1492, he found *mahiz* grown and used by the Indians, and also in Yucatan upon its discovery in 1502. While Cabeca de Vaca was toiling his intermittent way from Florida to the Pacific coast in 1528 to 1536, he found maize grown in large fields, and stored in cribs, by the natives of those regions. Cortez had previously found maize in Mexico, at the period of the invasion, and at Cempoalla, in 1519, had eaten maize made into bread-cakes, and on the march to Mexico passed amidst flourishing fields of maize. When De Soto invaded Florida in 1539, *maes* occurred everywhere in large fields; and the same year Marco de Vica found maize growing in New Mexico in fields. In 1540 Vasquez de Coronado mentions fields of maize in the valley of San Miguel, and also in store at Cibola; and it is also mentioned in Castanedo's Relations for the same date. Alarcon, in 1540, found it growing in his journey up the Colorado River, and Antonio de Espips in 1583 found it under cultivation by the Concho Indians of this region. When Cartier visited Hochelaga, now Montreal, in 1535, that town was situated in the midst of extensive corn-fields. In 1586 Heriot refers to maize cultivated in Virginia, and called by the natives "*pagatour*," and John Smith in 1606 describes the Indian method of culture then. Champlain in 1605 found it growing in fields all along the New-England coast, and describes the manner of its culture. Our Puritan fathers found it in store upon their first expedition of discovery, and speak of the deserted corn-fields,

for the time was winter. The Five Nations, in 1603, made corn-planting their business before the French arrived in Canada. The Iroquois raised it in such large quantities that in the invasion into the country of the Senecas, in 1687, some 1,200,000 bushels were destroyed. The Indians of Illinois cultivated corn when the country was first described by Marquette in 1673, by Allouez in 1676, and Membre in 1679. In Louisiana they had even invented a hoe for its culture.

This list might be indefinitely extended; for so universal was the use of maize by the aborigines, that its mention is to be found in nearly all the early chroniclers, and it seems never to have been grown as a luxury simply, but rather as a source of supply, and as a staple food. In the southern country it was so largely grown that many tribes may be considered as agriculturists rather than as hunters; in the northern countries it shared with the products of the chase the claims of a sustenance. Its merits, too, were quickly recognized by Europeans, and it soon found introduction to Europe and a wide distribution. It had a strong agency in the settlement of this country, as it afforded relief from starvation to the "Conquistors" in the South, and to plain Miles Standish and his contemporaries in the North. The Indian made his conquest the more easy by feeding his invaders from the produce of his corn-field, and the parched grain supported him again in his defense. Among the more imaginative Indians of the South maize became an object of worship, and a means of conferring honor: it formed portions for gifts, and in one instance was poured upon the ground for the trampling of the horses, as an earnest of welcome to the Spaniard. Everywhere the grain supplied food, in many places was parted into a drink, and the leaves and stalks were crushed to secure the juice to be boiled into a sirup or sugar, and the stalks were used to form bags and other material of wigwam use. It is passing strange that the corn-plant does not appear upon the coat of arms of any of the States whose early necessities it relieved.

There is some reason to believe that this grain was a native of the East, and thence transplanted centuries ago to this continent. There is a rep-



MAIZE, OR INDIAN CORN (*Zea mays*).

resentation of the plant found in an ancient Chinese book in the royal library in Paris, and grains of it are alleged to have been discovered in the cellars of ancient houses in Athens. Some even hold that it is the "corn" of Scripture. However all this may be, its use on the eastern continent was wholly extinct when Columbus sailed to find the desired northwest passage, and stumbled, instead, upon America. He introduced, or re-introduced, it to Spain. It is now in general cultivation in the south of Europe, and supplies a principal part of the food of the inhabitants of many countries of Asia and Africa. William Cobbett tried to introduce it as a regular crop into Great Britain, but unsuccessfully. No variety yet tried can be ripened in the ordinary seasons of that country. The best and most productive varieties require about five months from planting to ripening.

Indian corn is by far the most productive of all the cereals, yielding sometimes an increase of 800 for one. It succeeds best in light, rich, deep and rather moist soils, and is generally planted in hillocks, a few grains in a hill. It is generally made the first crop in newly cleared land. Its uses are various, and so widely known as not to need enumeration. The late discovery of ensilage opens a new field, whose extent it is impossible at present to conjecture. And not only is this grain the most productive grown, but it is exceedingly rich in the elements of food.

This grain takes the lead of all others in extent and importance in the United States. The Census returns

	Acres.	Bushels.
1850.....		502,071,104
1860.....		838,792,742
1870.....		760,944,549
1880.....	62,368,504	1,754,591,676

in 1880 an average of over 28 bushels to the acre. In 1850, Ohio led off with 59,078,695 bushels, followed by Kentucky with 58,672,591, and Illinois with 57,646,984. In 1880, Illinois led with 325,792,481 bushels, followed by Iowa with 275,014,247, and Missouri with 202,414,413. Thus Illinois and Iowa in 1880 produced more Indian corn than the whole United States did in 1850, by nearly one hundred million bushels.

Let Whittier bid the farewell to Indian Corn here; in

THE CORN SONG.

Heap high the farmer's wintry hoard! heap high the golden corn!
 No richer gift has Autumn poured from out her lavish horn.
 Let other lands exulting glean the apple from the pine,
 The orange from its glossy green, the cluster from the vine.
 We better love the hardy gift our rugged vales bestow,
 To cheer us when the storm shall drift our harvest-fields with snow.
 Through vales of grass and meads of flowers, our plows their furrows made,
 While on the hills the sun and showers of changeful April played.

We dropped the seed o'er hill and plain, beneath the sun of Mây,
 And frightened from our sprouting grain the robber crows away.
 All through the long bright days of June its leaves grew green and fair,
 And waved in hot midsummer's noon its soft and yellow hair.
 And now with autumn's moonlit eyes, its harvest-time has come;
 We pluck away the frosted leaves, and bear the treasure home.
 There, richer than the fabled gift Apollo showered of old,
 Fair hands the broken grain shall sift, and knead its meal of gold.
 Let vapid idlers loll in silk around their costly board;
 Give us the bowl of samp and milk; by homespun beauty poured!
 Where'er the wide old kitchen-hearth sends up its smoky curls,
 Who will not thank the kindly earth, and bless our farmer-girls!
 Then shame on all the proud and vain, whose folly laughs to scorn
 The blessing of our hardy grain, our wealth of golden corn!
 Let earth withhold her goodly root; let mildew blight the rye,
 Give to the worm the orchard's fruit,—the wheat-field to the fly;
 But let the good old crop adorn the hills our fathers trod:
 Still let us, for his golden corn, send up our thanks to God!

Sweet-Corn, and Succotash.—Certain varieties of maize are cultivated with special reference to their use in a green state, and have been developed into what now bears the name of sweet-corn. Country boys, and grown-up men who were boys in the country, know how eagerly the corn was invaded when the ears were first fit to roast, and how delicious the milky kernels are, even if half done inside and scorched and blackened outside in the extempore out-door roasting pit improvised with a few stones. And to the most experienced and educated palate, sweet-corn fresh plucked and properly boiled is a dainty dish, whether alone or joined with beans in succotash. But eaters who are too fastidious to eat the corn from the cob, lose half the glory. The teeth themselves yearn for the cob, and cannot be quite placated if the pleasure legitimately theirs be thrown away on a piece of senseless steel. And a dish of succotash properly made leaves one in doubt whether the savory compound, or its regal constituents separately, be more appetizing.

Sweet-corn should be planted for a succession of crops every three weeks from April to July in hills three feet apart each way, and six seeds in a hill; cover about half an inch, and thin out to three plants. These distances should be made a little greater or less, according to the variety grown and the richness of the soil. The taller the variety and the richer the soil, the farther apart should be the hills.

Stowell's Evergreen is a favorite variety, not early but very productive; is of large size, fourteen- to sixteen-rowed, very tender and sugary, remaining for a long time in an eatable condition.

Early Narragansett and *Early Marblehead* are newer varieties in high esteem.

Darling's Extra Early, is very popular, and, as the name shows, one of the first kinds to ripen.

The Mammoth Sweet is a very large late variety, the ears having usually 16 rows of kernels.

Rice.—This is one of the most useful and extensively cultivated of all grains, supplying the principal food of nearly one third of the human race. Originally a native of the East Indies, it is now cultivated in all quarters of the globe, and almost wherever the conditions of warmth and moisture are suitable. It is an annual, varying from one foot to six feet in height. Its cultivation is most extensively carried on in India, China, Cochin-China and other south-east parts of Asia, Japan, Egypt and several of the Southern States of the Union. A good specimen yields the following to analysis :

Moisture	13.00
Nitrogenous matter.....	7.44
Starch.....	77.63
Fatty or oily matter.....	0.70
Ash.....	1.23
	100.00

Rice contains, therefore, according to the prevalent views of modern chemists, a smaller amount of *flesh-forming* substances, and a larger amount of *fat-forming* or *heat-giving* substances than any other grain. As a food it is peculiarly well adapted for hot climates, as it appears to be



RICE (*Oryza sativa*).

almost a cure for dysentery and other bowel complaints, independently of which it is a sufficiently nutritious food without being heating. Owing to the small quantity of gluten which it

contains, it is capable by itself only of an imperfect fermentation, and is unfit for being baked into bread. It is, however, subjected to fermentation in many countries. The beer made from rice by the Japanese is called *saki*, and is in general use among them; but before being drunk it is heated in kettles. Several kinds of *rice wine* are made by the Chinese, some of them highly esteemed and very intoxicating. A spirit is distilled from the lees, called *shou-choo* or *sam-choo*. The common arrack of the East is made from rice, and rice is also employed to a very great extent by distillers in Britain.

The origin of the growth of rice in America is referred to the latter part of the 17th century, when a vessel from Madagascar is said to have brought a sack of the grain to Charleston, S. C., which was planted there and yielded largely. The culture spread, and eventually it became the staple product of that State, and was nowhere else grown so extensively until after the war of the rebellion. The mode of culture best adapted to the plant in South Carolina has been found to be by irrigation, and it is chiefly grown where the land is overflowed by the tides. The cultivation of rice spread rapidly from the beginning into most of the Southern States, and even so far north as Missouri, Tennessee and Illinois. But of late years rice has been most successfully cultivated in Louisiana, where it is grown on lowlands subject to overflow from the river, with due precautions against a possible crevasse. The water is conveyed by ditches and laterals, and is alternately turned on and drained off, as the condition of the plant and its progress may demand. When mature, the water is finally drained off, and the grain is cut and left to dry. After threshing, it is winnowed and placed in sacks, ready for the mill or market. The "upland" rice is dry cultivated, and is claimed by some planters to be better than the lowland, but the yield is not so generous.

Rice has a long and harsh beard, which is not removed by a simple threshing process. Machinery has to be provided to which the producer carries his crops. The milling process develops three products: first, or prime rice, seconds, or broken rice, and the flour of rice. Only about half the yield is left as prime rice.

Of course the method of cultivating lowland rice on the coast has proved very deleterious to the health of white men, developing malarial fevers, which, however, the negro rarely takes. On the Mississippi and other rivers, the cultivation of this crop does not seem to produce more unhealthy results than the cultivation of other crops in the same sections. There is, however, a profit in its cultivation, the net revenue of six different planters amounting to \$140 per acre.

The production of rice in the United States is not on the increase. The returns are:

	Pounds.
1850.....	215,313,497
1860.....	187,167,032
1870.....	73,635,021
1880.....	110,131,373

The product of South Carolina alone in 1850 was 159,930,613 pounds, fifty per cent more than that of the whole United States in 1880. In the latter year South Carolina still led, but with only

52,077,515 pounds, about one third of her product forty years before. This is nothing to mourn over. The industry once expended on rice is better employed. In 1840, the slaves themselves consumed enormous quantities of the grain, and the rice-fields were the dread of negroes in the more northern of the slave States, and inspired Whittier's famous "Lament of the Virginia Slave Mother," beginning

"Gone! gone! sold and gone!
To the rice-swamps, dank and lone."

VEGETABLES.

Potatoes.—These are among the most important of cultivated plants, and in universal use in the temperate parts of the world. The potato is a native of mountainous districts of tropical and sub-tropical America, but it is not known where it is really indigenous. Indian corn and the potato are the two greatest gifts of America to the rest of the world. No food-plant is more widely diffused; it is cultivated from near the equator to the arctic circle, where it fights for existence in gardens, yielding small and watery tubers. Its introduction into Europe prevented the once-frequent return of famine. But when the whole dependence of a people comes to be placed on this, and this fails, as sometimes in Ireland, terrible famine is necessarily the result. Humboldt calculates that the same extent of ground which would produce thirty pounds of wheat would produce 1000 pounds of potatoes. But the constant employment of potatoes as the chief article of food is not favorable to the development of the physical powers, and is consequently unfavorable to mental energy. It is calculated that 100 parts of good wheat-flour, or 107 parts of the grain, contain as much actual nutriment as 613 parts of potatoes. The inferiority of the potato in nutritious power is very much owing to the comparatively small quantity of nitrogenous substances it contains, in consequence of which it is most advantageously used along with some very nitrogenous article of food, with animal food, with curds or with cheese. The potato tuber, in a fresh state, contains about 71 to 80 per cent of water, 15 to 20 of starch, 3 to 7 of fiber or woody matter, 3 to 4 of gum, dextrine and sugar, and 2 of albumen, gluten and casein. There are considerable differences, however, in different varieties, in different stages of maturity, and in different soils and seasons.

Potatoes are raised by planting eyes or cuttings from the tubers. They are planted in drills made by the spade or plow. Farm-yard manure is

commonly used; after they are growing, care should be taken to keep the hills free from weeds and in loosening the earth. They are dug for table use long before they are ripe, new potatoes being a favorite dish and bringing a large price in city markets. Potatoes to be thoroughly healthy should be allowed to ripen, then after digging they may be stored for winter use. They should be kept in airy cellars or sheds where the light is excluded, as this gives them a green color and bitter taste.

Besides its value as a culinary vegetable, and for feeding stock, the potato has other important uses. Its starch is in large proportions and is easily separated; hence it is cheaper than any other kind and much more used. The tubers are washed, and are then rasped by machinery. The pulp thus obtained is received upon a sieve, and is washed continuously by a gentle stream of water as long as the washings run through milky, the milkiness being due to the granules of starch held in suspension. This milky fluid is received in vats, in which the amylaceous or starchy matter is allowed to subside, and where it is repeatedly washed, again suspended in water, run through a fine sieve, allowed to settle, and drained in baskets lined with ticking. The mass is then placed on a porous floor of half-baked tiles, and dried in a current of air, at first of the natural temperature and afterward raised by artificial heat.

The varieties of the potato in cultivation are very numerous, and admit of endless increase by propagating from seeds. A few of those regarded as the best are here enumerated.

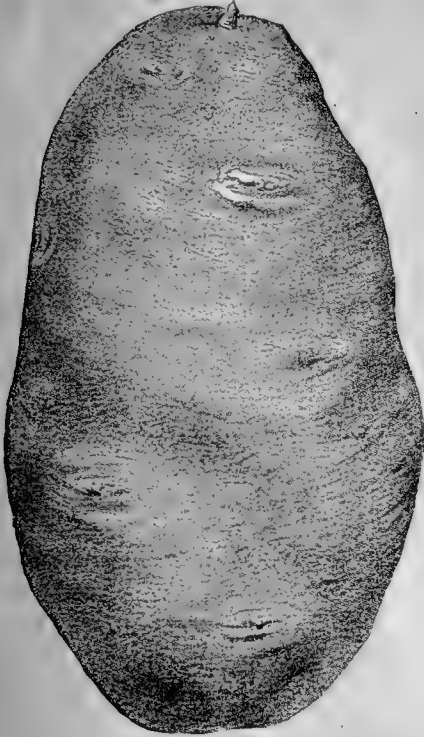
The *Early Rose* is one of the most popular varieties. None stands higher.

The *Peerless* is a larger and more productive variety, and ripens later.

The *Dykeman* has long been a standard potato in the New York market, and is raised in large quantities on Long Island.

The *Early Mohawk* is a productive variety, which keeps a place, not on account of superior

The *Peachblow* is still a great favorite, though its popularity is perhaps on the wane.



EARLY ROSE.



DYKEMAN.

Its flavor is fine, but it does not come to maturity till late in the season.



PEERLESS.



PEACHBLOW.

The *Kidney* is not as much raised for market as some of the others, but is a productive variety, and keeps well through the winter.

The *Jackson White* is a late potato, much grown, for market.

The first potatoes in market in New York are from Bermuda, and next from the Carolinas and Virginia. They bring high prices.

Potatoes are subject to many diseases. Dry-rot and wet-rot indicate the presence of fungi. Potato murrain is one of the chief diseases. The farmer may safely conclude when these and other diseases appear that the tubers, from being too often propagated, have become weak. Potato rust or blast destroys the foliage.

quality, but because it is ready to market so early.

To Preserve Potatoes from Rot.—Dust over the floor of the bin with lime, and put in about 6 or



KIDNEY.

7 inches of potatoes, and dust with lime as before, then more potatoes, using about 1 bushel of lime to 40 bushels of potatoes. The lime improves the flavor of the potatoes, and effectually kills the fungi which cause the rot.

The Colorado Potato-Bug.—But the worst enemy which the farmer has to contend with is the



COLORADO POTATO-BUG.

Colorado potato-bug or beetle. This troublesome insect has traveled eastward with astonishing rapidity, and has done great damage. He is one third of an inch long, yellow in color, with

ten black stripes on his wing-sheaths, five on each. During the winter he is under the ground. When vegetation starts, up starts the beetle. The female lays its eggs in clusters on the under side of the leaf, and the larvæ which are produced feed upon the young potato-leaves, becoming beetles in about four weeks after hatching. Fortunately for man, the potato-bug has many enemies.

How to Destroy the Potato-Bug.—But Paris green, a poison, is the farmer's principal weapon to destroy this pest. Persistently used it will save the crop, and no bad results have seemed ever to follow either to the ground or the plants. It may be made and applied as follows: Dissolve 2 pounds sulphate of copper in 1 gallon hot water in a stone jar. In another jar put 1 pound of white arsenic and 2 pounds pearl ash in 44 pounds hot water, and stir till dissolved. Mix when required in the proportion of 1 part of the former to 5 of the latter, and use with a sprinkler. It is certain death to vermin.

Another Method.—Mix 1 pound Paris green with 10 pounds poor flour or fine whiting. To use, take a circular piece of wood 4 or 5 inches in diameter (it may be cut out of a 2-inch plank), insert a mop-handle in the center, tack on an old tin can with one end removed for the reception of the block, punch the other end with holes through which to sift the compound on the hills as you pass along the rows, and bore a hole in the wooden end for the reception of the mixture, and fit a plug to secure it. The compound should be sifted on the hills while the vines are wet with dew or rain.

The Census reports the production of Irish potatoes as follows, in bushels:

1850	65,797,896
1860	111,148,867
1870	143,337,473
1880	169,458,539

In all these years New York has an enormous lead. In 1850 she raised 15,398,368 bushels, the next State being Pennsylvania with 5,980,732. In 1860 New York 26,447,394 bushels, followed again by Pennsylvania with 11,687,467. In 1870 New York raised 28,547,493 bushels, followed still by Pennsylvania with 12,889,367. In 1880 New York raised 33,644,807 bushels, Pennsylvania coming next with 16,284,819.

The Sweet-Potato (Batatas).—This is said to be a native of the East Indies, but is now cultivated in all tropical and sub-tropical countries for its tubers, which are highly esteemed as an article of food, and are eaten either roasted or boiled; they are sweet, wholesome and nutritious, but somewhat laxative. The sweet-potato was one of the products Columbus carried back to Spain, where it had come to be generally cul-

tivated by the middle of the 16th century. There is reason to believe that it is the potato of Shakspeare and of other early English authors, and that it was known in Europe before what is now called the Irish potato was introduced. The leading varieties are, in northern localities, the Nansmond and the Southern Queen, and farther south, the Yam. The mealy ones, abounding in starch, are best liked at the North, while at the South the moist or soggy ones, containing more sugar, are preferred.

Sweet potatoes are generally produced from sets or slips. To get these sets potatoes are laid upon the earth of a hotbed, the larger roots split lengthwise and put the slit side down, and covered with a few inches of light rich soil. Sprouts soon appear, which when they have made roots are broken off, to be planted, and the potatoes returned to the hotbed to produce more sprouts. The usual method is to lay strips of well-rotted manure about three feet apart, toward which a furrow is turned on each side, and on the ridges thus formed, after being well dressed with the rake or hoe, the sets or sprouts are planted about fifteen inches apart. These ridges must be kept clear of weeds till the vines cover them. Toward the end of the season the vines take root at the joints. Where there is no danger from frost this may be allowed, the vine becoming perennial. But farther north this must be prevented by occasionally moving the vines, and thus concentrating the vitality of the plant in the tuber. A slight frost kills the vines, when the roots should be at once dug, dried, and stored where the temperature can be kept at about sixty degrees.

The production of sweet potatoes does not increase with the growth of the country. The Census returns are as follows:

1850.....	38,268,148 bushels.
1860.....	42,095,026 "
1870.....	21,700,824 "
1880.....	33,378,693 "

In 1850 Georgia led off with 6,986,428 bushels, followed by Alabama with 5,475,294 and North Carolina with 5,095,709. In 1860 Georgia again led with 6,508,541, followed by North Carolina with 6,140,039, and Alabama with 5,439,917. In 1870 North Carolina led, but with only 3,071,840, followed by Georgia with 2,621,562, and Texas with 2,188,041. In 1880 North Carolina produced 4,576,148 bushels, Georgia 4,397,778, and Mississippi 3,610,660. Sweet potatoes were raised for the use of slaves before emancipation, and fell off about half from 1860 to 1870, the same causes decreasing the production as in the case of rice.

Carrots.—The carrot is supposed to be native in countries bordering the Mediterranean, but has spread to many parts of the world, being

introduced to English gardens early in the 16th century. In the reign of Charles I. ladies wore carrot-leaves as an ornament in place of feathers, and the beauty of the leaves is still occasionally acknowledged, by placing a root, or the upper portion of one, in water, that it may throw out young leaves to adorn apartments in winter. The carrot contains a large amount of what are called heat-producing compounds, with a small proportion of flesh-forming matter. A dried carrot yields by analysis:

Starch and sugar.....	93.74
Albumen.....	4.55
Red neutral substance (carotin).....	0.34
Fixed and volatile oils.....	1.00
Ash.....	0.76
	100.00

Carrots promote digestion, and are valuable as a substantial food for horses and stock. Prof. Mapes used to maintain that they were useful to horses, not only for the nourishment in themselves, but because the acid they contained enabled the animal to digest and assimilate food-elements which would otherwise pass off unused. A few carrots morning and night fed to a milch-cow will improve the quality and the color of butter made from her milk. The root is a large bearer, an acre of ground yielding 500 to 1500 bushels. Its cultivation is troublesome, but may be made profitable.

Carrots grow well on deep soil which has been made fine by three plowings before sowing. The first plowing should be in the autumn. The manure should be spread broadcast on the surface before the last time of plowing. Harrowing should be done twice, and before the last time the soil should have a dressing of compost which will insure a vigorous start for the carrots. The field should be laid out in ridges made by plowing through in straight lines, and on them the seed is sown, which should be fresh and about four pounds to the acre. If radish-seed be sown at the same time, the carrots can be kept weeded, as the radishes spring up in a few days, thus indicating the line sown. The radishes are of course marketable, and may be pulled as soon as ready. Carrots should be dug and housed for the winter in the region of New York as early as November. If cellar-room is limited, pits may be dug in a sloping piece of ground, and in these hundreds of bushels of carrots may be placed, covered well with straw and earth, and provided with ventilating pipes or shafts.

Turnips (*Brassica rapa*).—The turnip, generally regarded as a native of Great Britain, has long been cultivated, and is to be found in every garden of the temperate and cold parts of the world as a culinary esculent. It is also exten-

sively grown in fields for feeding cattle and sheep. There are two distinct classes of turnips: the Common, or English, or Round, with the root rounded and often broader than long, and having usually lobed, hairy and rough radical leaves; and the Swedish or Russian turnips, often called "ruta-bagas," having larger, more elon-



AMERICAN IMPROVED RUTA-BAGA.

gated and more solid roots, and with the radical leaves smooth and covered with a bloom, like those of the cabbage. There are yellow and white varieties in both classes. They like a loamy soil, midway between the extremes of clayey and sandy. The flat Dutch is a round quick-growing kind much liked, and must be sown early. Ruta-bagas and the field-crop should be sown later, and are usually planted in drills.



STRAP-LEAF RED-TOP.

Notwithstanding their value as food for cattle, the amount of nutritive matter contained in them is very small, ruta-bagas showing about 87 per cent and the common kinds over 90 per cent of

water. Some varieties grow to an enormous size, often weighing more than twenty pounds. Of the ruta-bagas, the white French variety has its root entirely under ground, and is a great favorite for the table.

The American *Improved Ruta-baga* is much grown, and possesses a very delicate flavor.

The *White Dutch* is an early kind, white, and of medium size.

The *Yellowstone* is a profitable variety for markets; light yellow, and sweet.

The *Strap-leaf Red-top* is well known. A flat turnip, showing purple above ground and white below, with flesh very white and delicate when cooked.

The *Cow-horn*, on good soil and under proper cultivation, yields enormously. It is about a



COW-HORN.

foot long and three inches in diameter, showing green above ground and white below. This variety is not only good on the table, but is grown extensively as a field-crop.

Beets.—The common beet (*Beta vulgaris*) is a native of the shores of the Mediterranean, but is now in very general cultivation both in fields and gardens, chiefly for the sake of its large succulent and generally carrot-shaped roots, which are used as food both for man and for cattle, and from which also sugar is largely extracted. The variety chiefly cultivated in gardens is known as *Red Beet*, from the color of the root, which also more or less appears in the leaves and leaf-stalks. The sub-varieties are very numerous. In

some the root is rather turnip-shaped than carrot-shaped, and the size and color also vary much, some being of a deep blood-red or even almost blackish color, both externally and internally; and others of a much lighter red, and internally even white. It forms a favorite pickle, and is also very agreeable as a boiled vegetable when properly dressed. The seed is sown so late in spring that the plants may not produce flowering stems the first year, which, when it occurs, renders the root fibrous and useless. *Mangel-wurzel*, so valuable as a field-crop for food of cattle, is, in general, regarded as merely a larger and coarser variety of the common beet, in which the red color is comparatively little exhibited, although some botanists have, on very slender grounds, endeavored to erect it into a distinct species. The *White Beet* of our gardens is now also generally supposed to be a mere variety of the common beet, with little or no red in its roots or leaves, and a comparatively slender root. It is cultivated for the sake of its leaves, which are used in the same manner as spinach, and form an excellent substitute for it, especially in the beginning of spring.

Chemists have calculated that 18 tons of mangel-wurzel are equal to 15 tons of Swedish turnips, or 7½ tons of potatoes, or 3½ tons of good hay, each quantity containing the same amount of nourishment. But these roots may be grown upon less than an acre of ground. The beet-root is regarded also as being the least exhausting to the land.

Among the best kinds are

The *Long Orange*, suitable both for garden and for field growth. This variety takes its name from its color and the length of its root.

The *Long Smooth Blood-Beet* is the old standard variety, which still keeps its place at the head of the market.

The *Dark Red Egyptian Beet* is another variety becoming popular. It is round and flat in shape.

The *Early Blood-Beet* is a round variety, and the earliest in market.

John M. Bailey before referred to says he raised on an eighth of an acre 225 bushels of long red mangels, and on an adjoining eighth 160 bushels of yellow globe mangels. The average of these is 1540 bushels; at 60 tons to the bushel, a little over 46 tons to the acre.

BEET-SUGAR.

The production of sugar from beets has long been an important industry on the continent of Europe, but did not get a foothold in Great Britain till 1868-9, in which years Mr. James Duncan completed a factory at Lavenham. He had previously contracted with various farmers in that neighborhood to raise beets for him at the price of 20s. per ton of clean roots delivered at his factory, with the option to the growers of receiving back the resulting pulp at 12s. per ton if removed as made. This enterprise has been followed by others of the same sort. Experience has shown that the small roots are richest in sugar, and that 2½ pounds per root is the best size to aim at. The part of the bulb that grows above ground contains very little sugar. The objects aimed at therefore are, to have a large weight per acre of roots individually small, and as little of the root as possible exposed to the light. This is accomplished by sowing the crops in rows about 16 inches apart, and leaving the plants close to each other. The return of a single year from 571 acres of land cultivated by 32 growers was 7855 tons, an average of 13½ tons per acre, the 89 best acres averaging 17 tons per acre, and the 62 poorest averaging 8 tons per acre.

The Pulp.—Mr. Duncan did not sell back to the farmers all the pulp he made, having at one time 500 tons remaining on hand. This he of course wished to preserve without deterioration; and it is curious to see that, the year before M. Goffart announced his discovery of Ensilage, very nearly his methods were successfully employed with this beet-sugar pulp. "On a piece of dry ground a trench is dug out about seven feet wide by one foot deep. Into this trench the pulp is firmly trodden by the feet of the laborers, and gradually drawn to a point, precisely as is done in storing roots. The whole is then covered with earth to the depth of twelve inches; and thus stored the pulp keeps well for two or three years. In using it, a thin crust from the outside is rejected. Three tons of this pulp are estimated to be equal in feeding value to one ton of good hay. Mr. Duncan regards any preference for fresh-made pulp as a mistake; as in his own practice he finds that pulp a year old is a better feeding material than when newly made. In one season he fattened 50 cattle on pulp three years old, and in another summer he had 60 cattle consuming the surplus of the previous year.

On the Continent.—In a single year there have been produced 1,025,000 tons of beet-sugar and 250,000 tons of molasses, representing a value, at \$120 for the sugar and \$15 for the molasses, of



LONG SMOOTH BLOOD-BEET.

nearly \$127,000,000. Russia produces the finest quality of beet, instances being known in which the root yielded 10 per cent of loaf-sugar. It is said that in Europe the erection of a beet-root-sugar factory enhances the value of the neighboring land. The success of the enterprise was greatly owing to the enterprise of Franz Carl Achard, who at almost the close of the 18th century took up the work a Berlin chemist had undertaken nearly fifty years before. Louis Napoleon states that while Achard's experiments were going on, the British Government, alarmed lest his discoveries should injure British colonial interests, offered him anonymously 50,000 thalers, and afterward 200,000 thalers, if he would report that his experiments resulted unfavorably. The offer was rejected with contempt, and the successful results of his experiment made public. This may be so; and again, there might be better authority for such a statement than "the nephew of his uncle."

In the United States.—Unsuccessful attempts were made to introduce this industry here as far back as 1830, information being scanty, and the yield of sugar from beets at that time in Europe only 4 to 5 per cent. In 1838 David Lee Child (the husband of Lydia Maria Child), made at Northampton, Mass., 1300 pounds of beet-sugar. There the matter rested again for 25 years, and but very little was really accomplished till 1870, when the Alvarado Sugar Co. in California began work, and the industry has since assumed large proportions. Land planted on a large scale with sugar-beets near one of the California factories averages 12 tons to the acre, and near another 8 tons; while the average yield of sugar is 160 pounds to the ton of beets, or about 8 per cent.

While the sugar contained in the beet is in itself identical with cane-sugar, the composition of the beet offers obstacles to the manufacture of sugar not present in the cane. The percentage of sugar in the former is about two-thirds that of the latter, and the juice is highly charged with impurities which must be removed. Prof. Chandler, in *Johnson's Cyclopaedia*, writes: "The manufacture of sugar from the beet consists of the following operations: 1, washing and cleaning the beets; 2, extracting the juice; 3, defecation by lime and heat; 4, carbonatation, removal of the lime with carbonic acid; 5, filtration, to remove suspended impurities; 6, filtration through bone-black; 7, evaporation to a thin sirup; 8, second filtration over bone-black; 9, evaporation to crystallization; separation of the sugar from the molasses. The first molasses is evaporated again, to furnish a second crop of sugar, and a third and fourth crop are subsequently obtained. The final molasses is too offensive in taste and

smell to serve as food, and is diluted and subjected to fermentation and distillation for the production of alcohol, the residue from the distillation being evaporated to dryness and calcined for the production of potash."

Bailley reports 252 bushels yield of sugar-beets on one fourth of an acre. This rate gives 1008 bushels to the acre; at 60 pounds to the bushel, 60,480 pounds, amounting, at \$5 per ton, to over \$150. Where sugar-beets can be marketed near by, their raising seems a profitable business.

The varieties of sugar-beets mostly raised in the United States are the White Sugar-Beet, Vilmorin's Improved White Sugar-Beet and Lane's Imperial Sugar-Beet. This last is the result of careful selection in this country, and is recommended as being hardier, more productive, and containing a greater percentage of sugar.

Cabbage.—This plant, *Brassica oleracea*, is a native of the rocky shores of Great Britain, and in general cultivation as food for man and cattle. The ordinary forms are often called by the general name of white cabbage, to distinguish them from the red cabbage, of a deep brownish red or purplish, mostly used for pickling. It contains more than 90 per cent of water, and affords little nutriment. Its digestibility varies according to the state in which it is partaken of. Raw cabbage alone is digested in about two and a half hours, with vinegar in two hours, and boiled cabbage needs four and a half hours. Immense quantities are used by the Germans, at home and here, in the shape of *sauer-krout*.

For cabbages, the ground must be highly manured, deeply dug or plowed, and thoroughly worked, to insure good, full-sized heads. A heavy, moist and fresh loam is the most suitable. The early sorts are sometimes sown early in autumn, protected in cold-frames through the winter, and transplanted early in spring; but more generally at the North they are sown very early in the spring in hotbeds, or later in the open ground. In the mild climate of the Southern States, where they will stand the winter, they are planted out in the fall. One ounce of seed will sow a bed 40 feet square. The plants are usually set in rows about 2 feet apart, and 18 inches between the plants in rows.

Cabbages are an exhausting crop when wholly removed from the soil, and on this account are sometimes grown with advantage on spots greatly enriched by irrigation with sewage or otherwise, and where the succeeding grain-crop is expected to suffer from over-luxuriance. In favorable circumstances 30 or 40 tons may be grown on an acre.

The *Early Jersey Wakefield* is a leading early cabbage, of medium size, good quality, and sure to head. Will grow to 7 and 8 pounds each.

Henderson's Early Summer is another early cabbage, coming in about ten days after the *Waketfield*; but being of nearly double the size, it may be classed as the best large early cabbage. Its short outer leaves allow it to be planted very close—about 12,000 to the acre. They sometimes grow to 15 pounds. This kept up would make an acre yield 120 tons.

The *Mayblehead Mammoth Drumhead* is the largest of the late cabbages. Heads have been grown weighing 60 pounds.

The *Green Glazed* succeeds well in southern latitudes, and enjoys immunity from the attacks of insects. Heads are glossy pea-green.

The *Premium Flat Dutch* is probably more extensively grown than any other variety. It is for fall and winter use.

Cauliflower.—This is a species of cabbage greatly modified by cultivation. The leaves are not the parts used, but the flower-buds and their stalks; or, properly speaking, the inflorescence of the plant, forming a head or compact mass generally of a white color. Any soil on which common cabbage will grow will also produce cauliflower; but as the product is more valuable it will repay extra manuring and preparation of the soil.

For the spring or summer crop sow the early varieties about the middle of September, and when two inches high transplant to two inches apart, into a frame covered with glazed shutters, where they must be protected through the winter; in the spring transplant to two and a half feet apart, into soil prepared as recommended for cabbage. Sow the same varieties for succession in a hotbed in March, and transplant when large enough. For the autumn crop sow the late varieties in April or May in the open ground, and transplant like winter cabbages. In dry weather water freely, and as they advance in growth hoe deep and draw the earth to the stems. As they begin to head they should be well watered. One ounce of seed will sow a bed of forty square feet.

Lenormand's Short-Stemmed is a large late variety, with well-formed heads of superior quality.

Erfurt Early Dwarf is a favorite variety for the market; very early, fine compact heads, and of fine quality.

Henderson's Early Snowball.—Henderson says of this: It is the earliest of all cauliflowers. Sown at the same time and under the same conditions with ten other kinds, on the first of March last year, we had heads of the *Early Snowball*, measuring nine inches in diameter, ready by June 10—about one week earlier than any other sort. Besides, of this variety, every plant formed a fine head, in addition to its earliness and greater certainty to head than any other sort,

its dwarf habit and short outer leaves allow it to be planted as close as 18 or 20 inches apart each way, so that from 12,000 to 14,000 can be set out on an acre.

Beans.—The common bean is divided into two classes, dwarf or bush-beans, growing a foot or two high, and pole or running-beans, trained to climb bushes or poles. They are highly nutritious, containing 84 per cent. of nutritive matter, while wheat has but 74. The bean contains more nutriment for horses than the oat. Baked beans with pork are a favorite dish at the North, and one so hearty that it is a great favorite with men performing hard labor on the farm. It is a traditional New England dish. Great quantities of beans are pulled before the pods harden, and either eaten as "string-beans," or pickled before eating.



BEAN LEAVES AND FLOWER.

The bean originated in Persia, and the Egyptians were the first to cultivate it. Afterward, on some religious scruple, they gave it up. Pythagoras forbade his disciples to eat it, teaching that it was made at the same time and of the same elements as man, had a soul, and suffered transmigration.

Years ago, Mr. Mechi, a distinguished British agriculturist, in a hot dry summer, looked longingly on his bean-crop, then at its full growth and its green pods filled with soft pulse. He mowed the needed quantity each day, cut it up, and fed it green to his stock; and with the most satisfactory results. The quantity of green food per acre yielded by a full crop of beans used in this way is very great. This gives a hint in the direction of ensilaging the bean, and it is to be hoped that experiments with it may be made and reported.

Beans should be planted as early in the spring as the ground can be worked, from two to four inches apart, in drills from 24 to 30 inches apart. As soon as the plants are in full blossom, and the lower pods begin to set, pinch off the tops; this will insure the filling of the pods and hasten the maturity of the seeds. A strong, heavy soil with a considerable portion of clay is needed to insure a good crop. Beans are sensitive to frost and cold, and should not be planted before the middle of spring, when the ground has become light and warm. Hoe often, but only when dry, as earth scattered on the leaves when met with dew or rain will cause them to rust, and greatly injure the crop.

The *Golden Wax* is one of the best of the dwarf- or bush-beans. The pods are large, long and brittle, and entirely stringless. It excels both as a snap-bean and as a shell-bean.

The *Early Red Valentine* is another dwarf, early, productive; tender, succulent, and of excellent flavor: continues longer in the green state than most of the varieties.

The *Large White Lima* is one of the best known and liked varieties of pole-beans.

Dreer's Improved Lima comes earlier to maturity, and produces a large yield and extra quality of bean. It is also claimed that it produces more shelled beans to the pole than the large Lima.

The *Dutch Case-Knife* is a very productive variety, and one of the earliest; sometimes used as snaps, but generally shelled. Some prefer the taste and flavor of the Case-Knife to those of the Lima.

Peas.—Webster says: "When a definite number is referred to, the plural is written *peas*, as two *peas*, five *peas*; but when an indefinite quantity or bulk is spoken of, it is written *pease*." But we follow common usage in printing the plural as above. The garden-pea has come down to us from the Greeks and Romans. Sir Humphry Davy found in 1000 parts of pea-flour 574 parts of nutritive matter. A more modern analysis gives

Water.....	14.1
Casein.....	23.4
Starch.....	37.0
Sugar.....	2.0
Gum.....	9.0
Fat.....	2.0
Woody fiber.....	10.0
Mineral matter.....	2.5
	100.00

There are innumerable varieties both of the field-pea and the garden-pea, those of the latter being so much the products of horticultural art that they cannot be preserved without the utmost attention. Some of the kinds of garden-peas have long stems, and require for their support

stakes of six or eight feet in height; others are of humbler growth; and certain dwarf kinds, preferred as most convenient in many gardens, succeed very well without stakes.

The planting for an early crop of garden-peas should be made in the spring, as soon as the ground can be worked, in a warm, dry situation, and covered about three inches. The ground must have been manured the year previous, or the peas will be apt to grow too much to straw. Use thoroughly decomposed manure, if any, just before planting. The height to which all peas grow depends in a great measure upon the richness of the soil and the wetness of the season. They are usually planted in double rows from three to four feet apart, and those requiring it bushed when about six inches high. The larger and later sorts do better at a greater distance apart, leaving a broad space for planting low-growing vegetables between. They should be kept clean, and earthed up twice in their growth. As soon as the peas are gathered the straw must be pulled and removed. In dry weather the peas should be soaked five or six hours before planting, and if the ground is very dry they should be watered in the drills. From one to two bushels are generally required to an acre; one quart of the smaller sorts will sow about 120 feet, and of the larger sorts about 200 feet of drill.

The American Wonder stands at the head of the very early peas. It is a seedling, the result of a cross between the *Champion of England* and the *Little Gem*; it is one of the earliest wrinkled peas in cultivation, of the finest quality, and wonderfully productive; its great distinctive feature, however, is its compact and dwarf growth, seldom exceeding ten inches in height.

Laxton's Prolific Long-Pod is in great favor among the second early varieties. It is very productive, with long pods containing 10 to 12 peas each. Is about four feet high.

The Champion of England stands very high among the not-so-early varieties. It is of delicious flavor and a profuse bearer.

The *Marrowfats* are the peas of our boyhood, at which period their taste seemed matchless. The *White* attains a height of six feet. The *Black-eyed Marrowfat* does not grow nearly as high, and is extensively grown as a field-pea; hardy and productive.

In our northern markets the earliest peas are from the South, and especially from South Carolina, whence they begin to be shipped early in April.

Asparagus is a hardy perennial that, under proper management, when planted in the right kind of soil, will produce crops for an indefinite length of time. When well grown and carefully bunched it is sure to meet with a ready sale. The demand

for it has always been good, even when other vegetables were dull and selling at low prices.

Soak the seed twenty-four hours in tepid water, and sow early in spring in rows a foot apart, and keep clean by frequent weeding and hoeing. At one or two years old transplant to permanent beds. The ground should be trenched, or dug over, two feet deep, burying plenty of manure—decayed leaves, leaf-mold, rock-weed or kelp, when it can be had,—and mixing it thoroughly with the soil. Lay out the beds four and a half feet wide, and draw three drills, fourteen inches apart and six inches deep, lengthwise of each bed; place the roots in them, a foot apart, in their *natural position*, and cover four inches deep. A rich sandy loam is most suitable. Every autumn, after clearing off the stalks, spread on a covering of manure, to be forked in, with a good dressing of fine salt very early in the spring. A new bed should not be cut over before the third year.

The quality of asparagus will mainly depend on the strength of the soil; it is a voracious plant, and can readily digest any amount of the strongest manure food, which is better to apply on the surface in autumn, to be forked in early in spring. Salt is also an excellent application to asparagus beds. The brine from beef- or pork-barrels produces strong and vigorous growth.

The *Colossal* almost monopolizes the asparagus market, some great seed-merchants raising and offering no other variety.

Smalley's Defiance is very early, of good size, tender, and of delicious flavor.

Melons.—The melon, as its botanic name, *Cucumis melo*, indicates, is of the same genus with the cucumber, an annual, supposed to be a native of the sub-tropical parts of Asia, and to have derived its name from the Greek island Melos. With us they divide into two great varieties, the muskmelon and the watermelon. They adapt themselves to different climates, though they grow to the greatest perfection in southern latitudes.

Muskmelons.—Plant late in spring, in hills five or six feet apart each way, well manured with old rotten compost; scatter a dozen seeds to a hill, and after they are out of danger from bugs thin to three or four plants. When they have four or five rough leaves, pinch off the end of the main shoot, which will cause the lateral branches to put forth sooner. It will strengthen the growth of the vines, and the fruit will come earlier to maturity. A light, dry, sandy soil and a dry atmosphere are most suitable. Melons should not be planted near other varieties, if it is desired to preserve them pure. They have arrived at perfection when the stem will cleave from the fruit. A very rough netted skin is the surest indication of a high-flavored fruit.

Favorite varieties of muskmelons are:

Nutmeg.—Fruit nutmeg-shaped, skin deep green, finely netted; greenish yellow, rich and sugary.

Cassaba.—A muskmelon of extraordinary size and delicious flavor; weight from 12 to 15 pounds.

Green Citron.—Fruit medium size, deeply netted; shape nearly round, from six to eight inches in diameter; flesh green, and of rich, delicious flavor.

Large Yellow Cantaloupe.—A good-sized, nearly round fruit, netted and slightly ribbed; flesh salmon-colored, thick and musk-flavored; an early and productive variety.

Large Yellow Musk.—The largest variety, long oval shape, deeply ribbed; flesh thick, light, salmon-colored and of peculiar musky flavor; early and productive. This variety is used in its green state for "mangoes."

Watermelons.—Plant in hills, six to eight feet apart, in May. Select warm, light, dry ground, and in preparing the hills let them be dug out broad, and deep as the soil will permit; fill at least one third full of the best decomposed stable-manure, and mix thoroughly with the soil, filling up a little above the level of the ground. The plants will fruit better by occasionally pinching the leading shoots off the vines. One ounce of seed will be sufficient for about one hundred hills.

The *Ice-Cream* watermelon is a favorite variety of medium size, nearly round; color pale green; white seed, thin rind; flesh solid, scarlet, crisp, of delicious flavor.

The *Black Spanish* is another excellent variety, round, very dark green, with scarlet flesh and black seeds, very thin rind and rich sugary flavor, sweet and delicious.

The *Scaly Bark* watermelon is a new variety first brought into general notice at the Atlanta Exhibition in 1881. The skin is dark green and looks as if covered with fish-scales, although quite smooth. It is said to be an unusually productive sort, the average weight of the melons being 35 pounds, although it is not unusual for specimens to reach 65 pounds in weight. The flesh is light crimson, solid, tender and of exquisite flavor, but its peculiar value lies in the fact that it remains in choice eating condition from ten to fifteen days after being pulled. This with its very tough yet thin rind will make it a most valuable sort for shipping purposes. Already some of the largest melon-growers south believe that it must displace all other sorts on this account alone.

Varieties of melons have such a tendency to mix that growers generally restrict themselves to a very few kinds; taking care that their borders are not contiguous one to another. An attempt was made in California to produce sugar from

watermelons, but the industry was not a successful one.

Melon-vines are in especial danger from insects, and seed is therefore sown freely, that enough may succeed; and it is often necessary to dust the vines with lime or ashes.

Cucumbers.—The common cucumber is a native of tropical Asia. Cucumbers succeed best in warm, moist, rich loamy ground. They should be sown in small pots in a hotbed or hot-house, in January, February and March. They should not be planted in the open air until there is a prospect of settled warm weather. Plant in hills about four feet apart each way. The hills should be previously prepared by mixing thoroughly with the soil in each a shovelful of well-rotted manure. When all danger from insects is past, thin out the plants, leaving three or four of the strongest to each hill. The fruit should be plucked when large enough, whether required for use or not, as, if left to ripen on the vines, it destroys their productiveness. Sixteen or eighteen hills well grown will supply an ordinary family.

Early Russian.—This is the earliest variety in cultivation; fruit produced in pairs, and the first blossoms usually make fruit; small, hardy and productive, and flavor pleasant and agreeable.

Improved Early White Spine.—An improved variety of the well-known White Spine, which has succeeded better than any other variety for forcing on a large scale. Medium size, deep green, flesh crisp and of fine flavor.

Green Prolific.—One of the best varieties for pickling. It is a very uniform producer, hardly ever yielding cucumbers too large for pickling, and is immensely productive. With good cultivation 200,000 may be produced upon an acre.

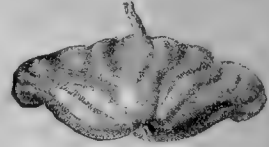
Early Frame.—This old and popular variety has not lost its hold on public favor, for the table or for pickling. Medium size, straight and handsome, and makes a beautiful pickle that keeps well.

Squashes.—These, as well as pumpkins, are members of the gourd family, modified by long periods of cultivation into delicious edibles. For practical purposes they fall into two great divisions, one the summer- or bush-squash, the late varieties forming the winter-squash.

They are of vigorous and luxuriant growth, and will well repay generous treatment, although they will grow after a fashion almost everywhere. They should not be sowed until the weather has become settled and warm. Light soils are best suited for their growth. The hills should be prepared for seeds in the usual way, a couple of shovelfuls of well-decayed manure being mixed with the soil of each hill. Hills should be three or four feet apart each way for the bush varieties,

and six to eight feet for the running sorts. Put in each hill eight or ten seeds, afterward thinning out so as to leave three or four of the strongest plants.

White Bush Scalloped.—This is an early, flat,

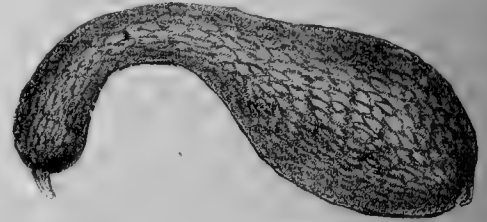


SCALLOPED SUMMER.

scallop-shaped sort, light cream-colored. It is called "Patty-Pan" in the Southern and Middle States.

Boston Marrow.—A much-esteemed variety, coming in about ten days later than the bush sort. It is a good keeper, and of unsurpassed flavor.

Bush Summer Crookneck.—This is the richest



SUMMER-SQUASH.

and best sort for summer; very early and productive; fruit orange yellow, with warty excrescences.

The **Hubbard** is one of the best late squashes, the finest table-squash known, the quality being about equal to the sweet-potato. It has a hard shell, and will keep three months later than the Marrows.

Pumpkins.—These can be grown on any good soil that is warm. They are excellent for pies, and for feeding to cows. They are usually planted in corn-fields where the vines can grow to a great length, but can be profitably raised in fields by themselves. Plant in hills eight feet apart. One pound of the common field sorts will plant from two hundred to three hundred hills.

The **Large Cheese** is hardy, very productive, and superior in all respects to most of the field-grown sorts.

The **Large Tours**, or **Mapmoth**.—This is a fine French variety, very productive, and growing to a large size, often weighing from 100 to 150 pounds.

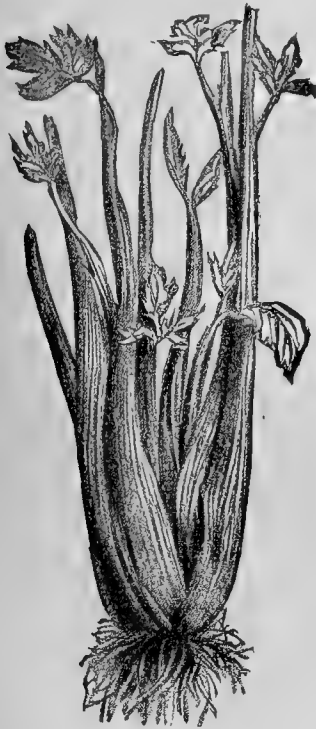
Tomatoes.—This plant is a native of tropical America, probably of Peru, and has come into general use only during the last fifty years. The old Indian name was *tumatt* or *tomatl*. Older English writers call it love-apple which name it

still bears in Italy and France. The tomatoes earliest in northern markets are from Bermuda.

Sown in a hotbed, green-house or elsewhere, keeping the temperature not less than 60°, in late February or early March. When about two inches high prick them out singly in small pots, and nurse carefully in frames, and when the danger of frost is past plant them out in a sheltered situation, where the sun may get at them. To hasten the maturity of the first fruit which sets, pinch off the extremities of the tops and all the secondary shoots which afterward appear above the flowers. For early crops plant them about three feet apart in well-manured hills. On heavy

Celery.—This plant is a development from the wild smallage, which is about two feet high, has a tapering slender root, an unpleasant odor, a bitterish acrid taste, and almost poisonous qualities.

For the first crop sow early in March in a gentle hotbed, and for the main crop early in April on a warm sheltered border, and water carefully. The plants must be transplanted as soon as they will bear handling; plant out at intervals until the middle of July. The ground for this crop should be dug into trenches two spades deep and one foot in width, banking up the soil on each side of the trench. In all cases let the distance between the trenches be such as will furnish suf-



WHITE SOLID CELERY.



INCOMPARABLE DWARF.

soils, not suited to yield early crops, four feet is near enough. Water freely at the time of transplanting. The vines often have to be supported by bushes or frames, and the fruit must be thinned out when there is danger of breaking.

The *Trophy* is one of the best tomatoes in cultivation. The fruit is large, generally smooth, solid; ripens early, and is of fine quality.

The *Canada Victor* is one of the earliest, of medium size, very symmetrical in shape.

The *Conqueror* is another fine early variety, of good size, uniform in shape and size, color deep red; flesh solid, of rich, mild flavor, ripens well clear to stem, and does not crack.

ficient soil for earthing up the plants. The bottom of the trench should be covered six inches deep with thoroughly decayed manure, and then covered with one or two inches of soil for planting. When planting, upon the surface instead of in trenches is adopted, the soil should be very rich and deep, and the plants placed in rows three feet apart, and from six to eight inches apart in the rows, according to the size of the variety. Place the plants about eight inches apart in the rows, removing them with a good mass of roots; keep them well supplied with water. Earth up the plants as they advanced in growth, but leave the hearts uncovered until the final soiling. This

operation of earthing should be performed only when the plants are dry, and at the final occasion neatly slant and smooth the soil so as to throw off the wet.

The *Giant White Solid* is the variety most commonly grown; clear, white, solid, crisp.

The *Boston Market* is a favorite variety, remarkable for its tender, crisp and succulent stems, and its peculiarly mild flavor; the Boston market-gardeners grow this almost exclusively.

Mammoth Red.—This is the largest grown, attaining under good cultivation the great weight of ten or twelve pounds, and is perfectly solid.

Incomparable Dwarf White.—A very dwarf late white, of stiff, close habit, solid, crisp and juicy.

Lettuce is a hardy annual and one of the most generally cultivated and popular of vegetables. It is divided into two classes, the Cabbage or Head lettuce, and the upright sorts known as the Cos lettuce. Lettuce grown in field may be planted between cabbages; and as it matures long before the cabbages need the space, the economy is evident. The best seed should be saved for planting, which should be done in autumn, and the plants moved into cold-frames which are kept covered during severe weather. For family use seed may be sown in hotbeds early in the spring, to be transplanted as soon as the weather will permit. By planting seed in succession and transplanting, the table will be well supplied during the season. Lettuce for winter market is an extensive business near large cities; and in its production large use is made of hotbeds and forcing-houses.

Tennis Ball is a black-seeded lettuce, which forms a close, large head, with a few outer leaves; a favorite forcing variety.

Boston Market is a superb variety, which grows very compact, and is white and crisp; one of the best for forcing.

The *Large India* is one of the largest varieties, which withstands summer heat better than most kinds; forms an immense solid head, which cuts white, brittle and almost transparent.

The *Paris Green Cos* is one of the best of the Cos varieties. Grows upright with long, narrow, dark green leaves. It should be tied up to blanch a week or ten days before cutting.

Onions.—The nativity of the onion is not certainly known, it being credited sometimes to India and sometimes to Egypt, as in each of these countries it has been cultivated from a remote antiquity. In Spain and Portugal a raw onion is frequently eaten like an apple, and often with a piece of bread forms the dinner of a working-man. It is very nutritious, containing a large quantity of nitrogenous matter and of uncrystallizable sugar, with an acrid volatile sulphurous

oil resembling that of garlic, which, however, is largely dissipated by boiling.

The onion thrives best in a rather deep, rich loamy soil, and, unlike most vegetables, succeeds well when cultivated on the same ground for successive years. The best culture requires that the ground should be deeply trenched and manured the previous autumn, and laid up in ridges during the winter to pulverize. As early in the spring as the ground is in working order commence operations by leveling the ground with a rake, and tread it firmly; sow thinly in drills about a quarter of an inch deep and one foot apart, cover with fine soil and press down with the back of a spade or a light roller. When the young plants are strong enough, thin gradually so that they stand three or four inches apart. Keep the surface of the ground open and free from weeds by frequent hoeing, taking care not to stir the soil too deeply, or to collect it about the growing bulbs.

Extra Early Red.—Rather smaller and flatter than *Large Red*, close-grained and heavy; fit to gather the last of July, and keeps well.

Wethersfield Large Red.—The staple variety of Eastern growers; large-sized, deep red, thick, nearly round, fine-grained, pleasant-flavored and productive; an excellent keeper.

Yellow Dutch.—The common yellow variety; rather fat-shaped, and of excellent flavor. Good to keep.

Large Italian Red Tripoli.—As its name indicates, an Italian onion; an excellent variety of quick growth and mild flavor. Grows to two and a half pounds.

Rhubarb.—The roots of this plant have long been famous for their medicinal qualities. The best comes from Turkey and China. Russia rhubarb used to stand at the head of all, a strict supervision being exercised by government officials over all offered for export, a supervision which has been abandoned. The rhubarb of gardens is derived from different species of Rheum, especially *R. rhaponticum* and *R. undulatum*. The parts chiefly utilized are the fleshy footstalks of the leaves, much used for puddings, tarts and pies, as well as for stewing.

Sow in spring in a seed-bed, in drills one foot apart. Cultivate well during the season, and in the autumn or following spring transplant the roots into deep, rich soil, from three to four feet apart. They are fit for use about the third spring after planting. The most expeditious mode to procure a supply is to plant roots already grown, which will come into use immediately.

The *Linnaeus* is an early, large and tender variety.

The *Victoria* is a very large variety, and is later than the *Linnaeus*.

TOBACCO.

Tobacco is a word of uncertain derivation. Webster and Worcester take the word from the Indian *tabaco*, the tube or pipe in which the Indians or Caribbees smoked the plant. Sir Walter Raleigh enjoys the credit of introducing to the other continent the use which he found the aborigines making of it in this. We use the word credit, although there are multitudes of people who regard his achievement as worthy of blame rather than of credit. And unnumbered articles and books and verbal pleas have been made for and against its use. The genus bears the name *Nicotiana*, so named from Nicot, French ambassador to Portugal, who first brought to it the attention of scientific men, and who did much to render its use fashionable in France.

The plants have large, broad leaves; a five-



VIRGINIAN TOBACCO
(*Nicotiana tabacum*).

GREEN TOBACCO
(*Nicotiana rustica*).

parted calyx; a funnel-shaped, five-lobed corolla, and five stamens; the flowers growing in panicles at the top of the stem; the fruit a two-celled, five-valved, many-seeded capsule. The species are mostly herbaceous plants, rarely shrubby, with large broad leaves, and everywhere covered with clammy hairs. They are natives of warm countries, most of them American, although some are found in the East Indies. They all possess the narcotic property, on account of which a few of them are extensively cultivated. It resides in almost all parts of the plant, although the leaves are almost exclusively used. The plant is about 5 or 6 feet high, erect, with lanceolate, sessile leaves, 6 to 18 inches long, and rose-colored flowers, the throat of the corolla inflated, the

segments pointed. There are numerous varieties, differing more or less in the size and form of the leaves and in the form and color of the flowers, some of which are regarded by some botanists as distinct species.

Vast quantities of tobacco are raised in the United States, vast quantities are exported to the continent of Europe, and a great deal imported. If all sold as Havana were really Havana, the importations would be still larger. The production in the United States, according to the Census, was for

1850.....	199,752,655 pounds.
1860.....	434,209,461 "
1870.....	262,735,341 "
1880.....	472,661,157 "

Kentucky and Virginia have been and are the leading States; Kentucky returning 56,501,196 pounds in 1850 and 171,120,784 in 1880; and Virginia 56,803,227 in 1850 and 79,988,868 in 1880, to which latter may be added 2,296,146 from West Virginia, whose territory was a part of Virginia in 1850. Of the old Northern States, in 1880, there were reported in

Connecticut.....	14,044,652 pounds.
Illinois.....	3,935,825 "
Indiana.....	8,872,842 "
Iowa.....	420,477 "
Kansas.....	191,669 "
Maine.....	250 "
Massachusetts.....	5,369,436 "
Michigan.....	83,959 "
New Hampshire.....	170,843 "
New Jersey.....	172,315 "
New York.....	6,481,431 "
Ohio.....	34,735,235 "
Pennsylvania.....	36,943,272 "
Rhode Island.....	785 "
Vermont.....	131,432 "
Wisconsin.....	10,608,423 "

The cultivation of tobacco can be carried on in a range almost as great as that of Indian corn, but as it is destroyed by frost there is a great risk in northern latitudes. It requires a rich loose soil, and the strongest manures are advantageous. The influence of soil, climate and manures on the quality of the produce is very great. Vegetable manures are best for tobacco intended for smoking; animal manures are preferred for that which is to be made into snuff. In the Northern States the seed is sown in a hotbed, protected from frost by mats, and the plants are put out in rows from two feet to three feet apart in the field. The ground is frequently hoed and stirred. Where the plants are not intended for seed, the top is usually broken off, so as to prevent flowering, that its whole strength may be directed to the leaves.

When the leaves begin to become yellow, or are marked with yellow blotches, the plants are cut down and hung up in a large barn to dry. The cultivation of tobacco is comparatively easy, although a warm climate suits it best. The usual plan is to sow the seed in seed-beds of rich soil, and, as it is extremely minute, it is first mixed largely with sand or wood-ashes to assist in spreading it thinly. In Virginia this is usually done in the first week in January. After the seed-beds have been carefully prepared and sown, small branches of trees are laid over, to protect the seed, when it germinates, from the effects of frost; but these are removed as soon as can be done with safety, and the plants then grow rapidly, and are ready for transplanting into the fields about the beginning of June. The land in the fields is very carefully prepared, and small hillocks are raised up in rows; each is about a foot in diameter, and flattened at the top. With the first appearance of rain, the plants are carefully raised from the seed-beds and planted, one on each hillock. Only wet weather will do for planting, so that this operation often lasts until the end of July. When planted, the tobacco-crop requires much careful attention to weeding, and a watchful eye to prevent the ravages of various insect enemies. Much of this latter work is done by flocks of turkeys. As soon as the plants begin to throw up the flower-shoot it is nipped off; otherwise it would weaken the leaves. This process is neglected in some countries, especially in Turkey and Greece, where small leaves are preferred, and where in some cases, as in the celebrated Latakia tobacco, both leaves, buds and flowers are used.

The time generally chosen for cutting it is mid-day, or when the sun is powerful and the morning and evening dews absent. The cutting is done by hand, and only such plants are chosen as are ready, which is known by a clammy exudation which forms over the leaf, often giv-

ing it a spotted appearance. If the plants are very large, the stalk is often split down to facilitate the drying. They are then removed from the field to the tobacco-house, around which are erected light scaffolds, to which the plants are suspended, generally by passing a thin stick through a split in the stalk of each, and so placing a number of plants on each stick, just near enough to prevent them touching each other. After some time hanging in the open air, the plants on the sticks are removed, and suspended in a similar way inside the curing-house until the drying is completed. The leaves are next removed from the stalks, and all bad ones rejected. The chosen ones are tied up in bundles called hands, and these are packed in hogsheads, enormous pressure being applied in the packing. These hogsheads are 48 inches in length and 32 inches at the head, containing from 650 pounds of the lightest Maryland to 1500 of Ohio. There is a State inspection in nearly all the States where tobacco is grown, and the grade branded by the inspector determines the value.

Nearly half in value of all the tobacco grown is manufactured into cigars. In the revenue system here 25 pounds of rough leaves are allowed for 1000 cigars; and these cigars when ready for sale will average 15 to 17 pounds per 1000. Tobacco is the subject of heavy taxation in all civilized countries, and in some its sale is a government monopoly. In this country every form of preparation of the leaf for consumption is taxed, and the Internal Revenue Department is supposed to keep its eye open on tobacco everywhere.

Connecticut Seed-Leaf is a well-known variety; so are *Imported Havana, Virginia* and *Kentucky*.

The *General Grant* is the earliest tobacco in cultivation; produces immense foliage, of fine texture, small-veined and elastic; ripens as far north as Minnesota.



DOGS, VARIETIES AND TREATMENT.

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No one can doubt that the varieties of dogs existing to-day have been produced by selection and crossing.

Some breeds which existed twenty years ago have almost, if not quite, disappeared at the present day. The French naturalist Cuvier attempted to make a scientific classification of dogs, founded on the shape of the head, length of jaws, etc., although these distinctive features vary according to the

peculiar qualities, habits, etc., of the breed. This classification does not seem possible; and as the purpose for which a particular breed is used has largely to do with the form and psychic characteristics of the animal, the following classification given by Stonehenge is suggested:

1. Wild and half-reclaimed dogs, hunting in packs.
2. Domesticated dogs, hunting chiefly by the eye, and killing their game for the use of man.

3. Domesticated dogs, hunting chiefly by the nose, and both finding and killing their game.
4. Domesticated dogs, finding game by scent, but not killing it; being chiefly used in aid of the gun.
5. Pastoral dogs and those used for the purposes of draught.
6. Watch-dogs, house-dogs, and toy-dogs.
7. Crossed breeds, retrievers, etc.

CLASS I.

Among this class are the dingo, dhole, pariah, the wild dog of Africa, and the North and South American dogs.

The Dingo.—Is much like the fox in appearance, twenty-four inches in height, but, unlike the fox, carries the tail curled over the hip.

The Dhole.—A native wild dog of India, resembling the dingo, but without a bushy tail. He is a foe to wild animals, even the tiger, and has great speed and endurance.

The Pariah.—Also is a native of India, and although roving by nature, they can be taught to hunt.

The wild African dogs are wild, ferocious, and scavengers of the refuse in the village streets.

CLASS II.

The English Greyhound.—A combination of strength, grace and great speed.

The head of the greyhound is long, thin and tapering, with a full, clean eye. The ears small, and folded back closely to the head. The coat is glossy and smooth and may be of almost any color. A small greyhound is preferable for speed.

The Deerhound.—An animal suitable for any work, with a heavy head and neck. Color, dark-blue, fawn, grizzle, brindle. Coat, rough, coarser on the back than on other parts of the body.

The Russian Wolfhound.—This is a more recently popular breed, and is seen to some degree in America, although used more in Russia and Britain. The dog is of great size, a combination of greyhound and setter, with an elegant, strong form, and is exceedingly muscular.

CLASS III.

The Bloodhound.—The largest of hounds; he resembles the English foxhound.

Skull, narrow and domed. Eyes, small; set in head far back, and with a third red eyelid. Ears, very long and silky, hanging closely to the head. Muzzle, blunt on the end and long. Coat, short but soft. Color, tan and black.

The Foxhound.—The breeding of this dog has been most rigidly selected to fit him for his particular work, and his form is considered a model one for speed and endurance.

Head, large with good-sized brain.

Muzzle, long with open nostrils. Back, very

muscular. Legs and feet of great strength. Coat, thick and short. Color, black, tan, and white, black and white, and a yellowish tan.

The Beagle.—A symmetrical small foxhound, used in a pack for rabbit-hunting. Eyes, soft and mild in expression, with an indentation between. It is important that the dog should not stand higher than fifteen inches at the shoulder.

The Otter Hound.—Uncertain in temper but courageous. They are like the bloodhound with the exception of the coat, which is thick and suited to the habits of the dog.

The Basset Hound.—This dog is a slow traveler, which is considered desirable in hunting deer. The head is similar to that of a bloodhound; the body is long, but the legs are short with crooked fore-legs, so that the feet turn out.

The Dachshund.—This is a German name, meaning badger-dog. The body is long with very short legs, the front ones crooked, and turning out at the toes. The head is long, narrow, running to a peak on top. Bright eyes; long, silky, low-hanging ears. The coat is either long or short and very thick.

The Great Dane.—A cross between a mastiff and the greyhound; he is gentle and easily managed, although so ferocious in appearance as to make an excellent watch-dog for an estate.

The minimum height for the dog is 30 inches, weight 130 pounds; for the bitch, 28 inches and 100 pounds. The head resembles that of the bull-terrier. The ears are usually cut, but if not, are like those of the greyhound. Neck, long, and set cleanly on the body. Coat, short and thick. Colors, gray, blue, black, white, red, tan, brindle, with patches of dark color.

Terriers.—Many breeds for different purposes, but with certain characteristics which make the terrier race distinct. The head is somewhat wedge-shaped, with strong jaws and teeth, small, close ears, and bright, deep-set eyes. The body must be very strong and active, capable of speed. The coat may be very long and silky or short and thick.

The Fox-Terrier.—Used for starting but not killing the fox, a good rat-catcher, intelligent, lively and companionable.

Head, narrowing toward muzzle; ears small, frequently cropped; black nose; dark rims around eyes; teeth level; neck, clean and muscular; chest, deep; well-sprung ribs; loin, strong, not tucked up in flanks. Stern (tail), usually docked, but if not, should be carried high. Legs and feet resemble the foxhound. Coat, either smooth or wire-haired. If smooth, it should be rather coarse, flat, and thick; if wire-haired the coat should be hard, wiry and longer than the smooth-coated terrier. Color, should be brindle, red, or liver, with a large amount of white, and a trace of black. The weight should be from 16 to 20 pounds.

Irish Terrier.—This breed is not so extensively



AT BAY.

used in America as in Britain. He closely resembles the fox-terrier but is larger. A fighter, but companionable to man. Coat, straight, flat, much like a wire-haired fox-terrier. Color, whole-colored, red, wheaten, yellow and gray. Weight, 16 to 24 pounds.

Black-and-Tan Terrier.—A good dog for vermin but not as popular as the fox-terrier. Not sociable, and sensitive to cold. Head, long and narrow, wedge in shape. Eyes dark, very bright; ears, small, set close together on top of the head; chest, narrow between fore-legs, deep in brisket; ribs well sprung. Loin, slightly tucked up; quarters powerful. Feet, black nails; two middle toes longest. Tail, short and tapering. Coat, short and glossy. Color, very important, sharply defined. Black prevailing color. Weight, about the same as Irish terrier.

The Yorkshire Terrier.—A toy-dog, the chief feature being the coat, which is long, hanging straight down on each side from the top of the head to the tail. Head, small; nose, black; eyes, bright and dark; ears, small and half erect, sometimes cropped. Coat, steel-blue, with golden tan on muzzle; deep tan on ears and legs. Weight about five pounds.

Scotch Terriers.—Comprising the Skye and the hard-haired. These dogs are gentle and great pets. They stand low, with a long body, a Skye being three times his height in length. Weight should not be above twenty pounds. Coat, on the hard-haired type is about two inches long, hard and thick; on the Skye it is very long, bright and not silky, except on the top of the head. Color, steel or iron-gray, black brindle, brown brindle, and gray brindle. The color of the Skye most preferred is slaty or steel-blue.

CLASS IV.

In this class are included pointers, setters and different kinds of spaniels. All breeds of dogs, wild or domesticated, have a natural faculty for scenting their prey; but in the case of the class we are now considering there has been going on a rigid process of weeding out the inferior dogs, and breeding only from the best, through many generations, until a class of animals has been evolved, in which scenting game is not only a natural instinct, but also the reason for their greatest usefulness to man. A dog thus highly developed in "scenting" and "pointing" qualities, is of great sagacity and usually of a highly nervous organism. So important are these powers in this class of dogs, together with great speed and endurance, that symmetry and beauty of form are secondary considerations.

Setter and Pointer.—Skull, long, not wide, with long muzzle and widely opened nostrils. Eye, kind and intelligent; ears, long, low-hanging and soft. Neck, long and graceful; shoulders, back, loin, suited for speed and endurance. The leg-

bones, pasterns and feet must be strong. Coat in these breeds must be very thick and heavy, especially on the ears, legs, breast and tail. The pointer's coat is short and soft, but not as silky as the setter's. The Gordon is the largest and heaviest of the setter family; the Irish, the lightest built but most wiry. The English is a medium between the two.

Head.—The pointer's head is wider from ear to ear, consisting of two rounded flats with a depression between. The entire head of the Gordon is heavier than the others. The Irish setter's head is long and thin with a domed skull. All setters' noses should be dark in color. Tail is carried erect, curving slightly toward the back of the animal. Color, in the case of the English setter and pointer, is not of much importance; liver and white, black, white and tan, blue belton, white flecked with black. The choice color for the Irish setter is dark red.

Spaniels.—In Britain the Clumber, field, Cocker, Irish water and English water spaniels are used for hunting. In America the only one of these breeds which is popular is the Cocker. All spaniels are of a sweet, gentle, shy nature.

Cocker and Field Spaniels.—These dogs are low, heavy and cobby, weighing between eighteen and twenty-eight pounds. The eyes should be very bright and of the color of the coat. The neck fairly long but cleanly built; shoulders, muscular; chest, wide; ribs, well sprung; legs and feet, strong; fore-legs not bandy, as is commonly the case; feet, medium size, thick pads, and a deep fringe of hair between the toes. Length of body should be considerable; for the Cocker, "from tip of nose to root of tail about twice the height at shoulder, rather more than less." Coat very thick, silky, wavy but not too tightly curled; chest, tail, ears and legs heavily feathered. Color, black, liver and white, and various shades of red. Tail usually docked, especially if the dog is to be used for hunting.

Clumber Spaniel.—Very long body, heavy looking, with great power. Head very massive, flat on top, depression from between the eyes, running up to top of skull. Jaw long, with deep muzzle of great strength; nostrils, wide spread; eyes, soft, deep-set and intelligent; ears, long, turned over on front edge. Length twice and a half times height at shoulder. Coat, silky, straight, rather short, thick; color, lemon and white, orange and white, solid lemon or orange ears; tail usually docked, carried low.

Irish Water Spaniel.—Not as popular in America as in Britain, although no dog is better suited for water retrieving and duck-shooting. Very intelligent, but not always good-tempered. Head, medium length, broad. Muzzle, long and broad. Eyes, dark and bright. Ears, long and curly. Chest, deep. Loin, rather arching. Tail, strong, coming to a fine point at the end. Legs, long;

feet, large. Coat, small curls all over except on face and tail. On head a long top-knot, falling over the eyes. Color, dark liver, sometimes a little white on breast and toes.

Retrievers.—This breed of dogs is used in Britain for retrieving on land, but in America the spaniels, pointers and setters take their place. There are two classes of retrievers: wavy-coated and curly-coated black retrievers. Both kinds are large. This kind of dog was formed prob-

The Poodle.—In Europe these animals are used for fowling, but in America his chief use is that of lap-dog. He is very intelligent, and is frequently used for performing tricks in the circus, shows, etc. Head, large and broad; muzzle, long; roof of mouth, black; eyes, dark, with a direct look; ears, long and silky. Tail, frequently docked. Coat, in the Russian, stiff; in the French, woolly; in the corded, long curls. Color, pure white and pure black, sometimes a kind of liver color.



HUNTERS.

ably by a cross between a Newfoundland and the spaniel or setter. There are a few qualities which are essential, viz., speed, endurance, long neck for stooping power, scenting power, docility and a desire to work.

The Dalmation or Coach-Dog.—In his native country this dog is employed in the same way a pointer is used in this country. Here he is generally used for following a carriage, being adapted for long journeys; muscular, though not heavy. The markings are his chief attraction, counting 40 per cent, by standard of the club, being black spots on a white ground, the spots the size of an English shilling. The spots must also be so close that there will not seem to be patches of white.

CLASS V.

Sheep-Dogs.—This class includes the rough and smooth collies, and the bob-tailed sheep-dog. These dogs must be very intelligent, capable of great traveling powers and endurance, and heavily coated to resist rain and cold.

Rough Collie.—Head, flat, tapering toward the muzzle, the upper teeth projecting a little over the lower. Ears, very small and erect when listening; neck, long, also loin. Tail, long, well feathered. Coat, very abundant; outer coat, stiff and rather harsh; inner coat, soft and exceedingly thick. Color, sable and white, black and white, and black and tan. Size, twenty-two or twenty-four inches high.

Smooth Collie.—Is much like the rough collie

excepting his coat; his head also being wider. Coat, short and smooth.

Pomeranian or Spitz.—Used in his native land as a sheep-dog. In this country he has become a pet. He is between the collie and fox, the smaller specimens being more desirable. Coat, more like fur than hair; much like the collie. Color, black or white, very finely marked. Tail, curled over the back.

Newfoundland.—Used in native country for draught purposes; in other places for a companion and watch-dog, being very intelligent and noble, in which virtues he shares popularity with the St. Bernard. He is distinctly a dog of strength and activity. Head, massive, flat on top. Muzzle, short, square on the end. Ears, small, hanging close to the head. Tail, covered with deep fringe, carried low, and slightly curved. Color, jet black. Coat, coarse, thick but somewhat glossy. Height and weight, 27 inches at shoulder and 185 pounds.

CLASS VI.

These dogs are used for guarding property and persons on account of their warning bark, and their keen knowledge of intruders.

The Bulldog.—This race of dogs was originally bred for the express purpose of badger and bull baiting, their strength of jaw being their strongest point.

It does not of necessity prove that these dogs are always ferocious and on the fight, for their nature depends almost entirely on their bringing up. The appearance is that of a dog smooth-coated, with broad, deep chest, powerful, clean-cut legs, and a large head.

“The dog conveys an impression of determination, strength, and activity, similar to that suggested by the appearance of a thick-set Ayrshire or Highland bull.” (Standard.)

Tail, smooth, tapering. Weight, about 50 pounds. The “rose-ear” is preferred rather than the “button-ear” variety. Coat, smooth and short. Color, black brindle, liver and white in varying combinations.

The Mastiff.—The strongest and most muscular of dogs except the great Dane, and a great watch-dog, which is an instinct with him. A good companion, gentle, a caretaker of small children, and honest. He will catch and hold an intruder without doing him violence, as in the case of the bulldog. Head, broad. Body, massive, powerful. Legs, far apart and muscular. Skull, flat forehead, wrinkled depression between the eyes, running up on top of head. Proportionate length of muzzle to head and face, one to three. “Circumference of muzzle (measured midway between eyes and tip of nose) to that of head (measured before ears) as three to five.”

Ears, small, close to the head. Eyes, small,

wide apart, dark. Legs and feet, strong and rather large. Coat, short and close. Color, tawny, fawn, fawn brindle. Muzzle, nose and ears black, also around the eyes.

The St. Bernard.—Large, fine coat and color, courageous, intelligent, dignified. Exceedingly popular among men. Size, very important, especially head.

Head, very powerful. Skull, wide, curving on the sides. Eyebrows, strongly marked, deep wrinkles on the forehead. Muzzle, short tip, square end. Upper jaw usually over-hanging. Black roof in mouth. Nose, broad. Ears, very large, standing out slightly. Eyes, medium size, brown, set in deeply. Very good-natured expression. Shoulders, rather sloping. Legs, heavy; feet, large and broad. Tail, long and heavily feathered, slightly curled up. Coat, of two kinds, smooth and rough coat. In the smooth-coat variety the coat is close, wiry and very thick. In the rough-coated dog the coat is slightly wavy, never curly and long. Tail, bushy. Color markings, orange, tawny with white markings and dark shadings. These markings are most desirable:

White chest, feet, end of tail, muzzle, collar. White on nape of neck. A little dark on face and ears is considered desirable.

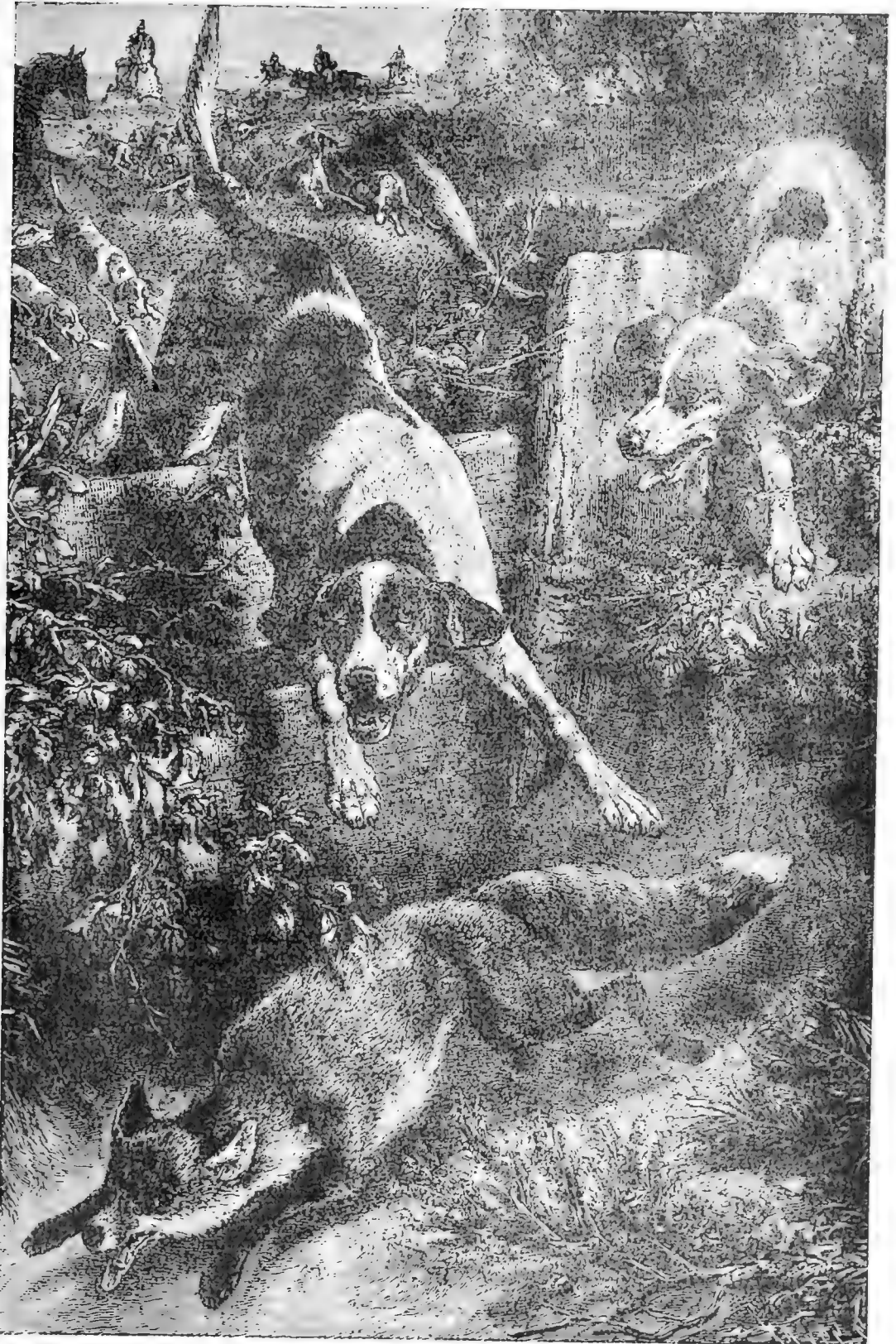
Toy Dogs.—These dogs are small specimens usually, and frequently lack in stamina, being so much confined to the house and having but little exercise, with a great variety of food.

Toy-dogs are usually intelligent, but are frequently obstinate and not always of a pleasant disposition; but they are kept for their good looks rather than for any other quality.

The chief breeds of America and Great Britain are the pug, spaniels and Italian greyhound; toy-terrier, and the Mexican hairless dogs.

The Pug.—A dog of not great intelligence, but active and independent. Very much like a small mastiff, but entirely different in disposition. Head, round, large, deep wrinkles. Muzzle, short and square. Eyes, very large, dark, prominent, intelligent in expression. Ears, soft and small. Body, legs and feet cobby in build. Tail, curl from tail over the hip; double curl especially desirable. Coat, smooth, glossy but not silky. Color, silver, apricot, fawn markings on muzzle and ears, diamond on forehead. The nose should be as black as possible. Size, 13 to 17 pounds.

Toy Spaniels.—Long-haired, affectionate and companionable. The different kinds are known by their color distinctions. Head, skull rather domed, branching from eyes. Muzzle, exceedingly short. Nose, turned up. Eyes, far apart, soft, large and lustrous. Ears, very long, 20 to 22 inches from tip to tip, longer than in either the King Charles or Blenheim. Tail, frequently docked. Coat, long, soft, wavy. Legs and feet, feathered, also the tail.



IN FULL CRY.

Color, varieties: King Charles, a silky black-and-tan. Blenheim, ground white, patches of red or chestnut. Charles I. spaniel, same as Blenheim; but with black in place of red.

Italian Greyhound.—Nervous, delicate, and exceedingly graceful; he much resembles the greyhound with the exception of not having so good a head. Coat, short and silky. Color, fawns more desirable. Size, not exceeding $7\frac{1}{2}$ pounds.

Mexican Hairless Dog.—This dog has almost no hair; the skin being copper color spotted with black.

Standards.—A standard of any breed should mean a nearly perfect dog. Clubs have been established in the interest of almost every breed, and we can attribute the good qualities of most of the dogs about us to the club's care in weeding out the inferior ones, and breeding only of the desirable. Holding dog-shows and giving prizes are a great stimulus to breeders of dogs to excel each other in the perfection of their kennels.

The dog, like most other quadrupeds, is made up of the following sections. Of the body:

Head, neck, chest, shoulders, back, loins, quarters, tail, legs and feet. Character plays a leading part in the desirability of the dog. He may be properly formed and perfect in almost every other respect, but without a good disposition he is hardly fit for any use.

Head.—This is a very important part of the dog, as it contains the brain, which is the location of the sensitive organs. It also determines the quality and general characteristics of dogs.

Neck.—It is not necessary to say much on this subject except that it should be in keeping with the rest of the dog and be free from loose skin.

Shoulders.—When the animal is to be used for speed the shoulders should be sloping, as in the greyhound; also the race-horse.

Chest.—The chest should be narrow in front to give room to the heart and lungs, but it must be wide above.

Back.—Must be rather short and level. Loins and quarters muscular, which means breadth and depth. In bitches there should be more depth than in dogs.

Thighs.—Well-developed and muscular.

Legs and Feet.—The feet should be very strong and muscular. From the elbow to the pastern the leg should be perfectly straight with a large bone. The pasterns must be strong to enable the dog to gallop, jump, etc.

Elbows.—Should also be strong and well turned, but neither "in" nor "out."

The feet are of two kinds, the harefoot and the catfoot. It is a question which is more desirable, but it is probably more a question of thickening of the pads than the former.

The toe-nails are important, as the loss of one may weaken the foot.

The tail seems to be of little importance, although it has much to do with the character and importance of good breeding. The tail is used frequently to enable the dog to balance himself, and the docked tail frequently causes the animal inconvenience for this reason.

Management of Healthy Dogs.—Mongrels are much more easily kept in a healthy condition than high-bred animals from the few essentials in management, such as housing, feeding, exercise and grooming, etc.

There are many opinions expressed on all these subjects; but the surest way to keep your dog in a healthy condition is to find out for yourself what things do, and do not, agree with him.

The Dog-Housing.—A life of comparative quiet is almost necessary to a dog's nervous organization. The natural inclination of such a dog is to retire in some corner for a quiet nap three times a day, and a dog's sleeping-place should be, first of all, cool, temperature not exceeding 60° , clean, absolutely dry, and ventilated.

A very good arrangement for a small dog is a large wooden box turned on its side, with a rug or piece of carpet spread inside of it. If the dog is housed out-of-doors in a kennel the subject of dryness becomes more difficult to handle. The floor of the house should be raised above the ground. The kennel should be placed in a sunny, sloping position with the outlook towards the south, so that sunlight can reach it at all times of the day. Fresh sawdust spread upon the floor is a good deodorizer. When boxes are used for beds they should be very often cleaned and disinfected to prevent vermin.

Feeding.—This is a subject of greatest importance to the health of the dog, and is responsible for a large amount of the ills of the canine race. For young dogs milk is most desirable; but the fact must be remembered that food must be varied according to the environments. Cooked meat is better when fed in large quantities; when raw meat is used, it should be closely examined to see that it contains no germs. Cooked liver is excellent, but not as a regular diet. An agreeable dish for a dog consists in boiling sheep's or ox's heads until the flesh comes off. Flavor the broth with salt, skim off the fat, and mix with it meal, corn-meal, spare bread or biscuits. Dog-bread, as Spratt's for instance, is convenient, but not good for regular use. Cake, candy, or other sweets; it is needless to say, are most injurious to a dog's digestion and bring on many troubles. Dogs that have a great deal of exercise, such as hunting, may be allowed about all the food that they will take; but dogs who are kept close at home and toy-dogs require a great deal of care. The breakfast should be simple, but at night the meal should be substantial. Toy-dogs must be given very little meat; milk, stale bread and eggs

are good substitutes. Two meals a day are sufficient for any dog.

Exercise.—If a dog is not used for any kind of work he must be exercised. To lead him by a chain is better than nothing, but it is a very poor idea. To keep a dog chained constantly is a cruelty. If it is considered necessary to keep a dog shut up, he should have a yard around his kennel, fenced in for his use. When a dog comes in tired out from a long run he should not be given food at once.

Care of Dog's Skin.—This requires a great deal of work. Brushing is necessary to all dogs, both to brush out any foreign matter which may have gotten entangled with the hair, and to improve the gloss and appearance of the coat.

Washing.—Large dogs are rather hard to handle when washed, and a cold is frequently the result. Keep the dog free from draught in a temperature not lower than 60°. For some dogs tar soap may be used; but in the case of spaniels it frequently fades the hair. A good all-round soap is Ivory. Use moderately warm water, with plenty of soap-suds, and use a scrub-brush. When the dog is taken out of the water dry him quickly, as much as possible, and allow him to lie rolled up in an old blanket until dry.

THE BITCH.

The female organs of generation at certain times undergo a great amount of energy, resulting in the maturation in the ovary, of eggs, which are discharged into the Fallopian tubes, where they become impregnated by the male cells. These periods of sexual activity in the bitch occur usually twice a year. Frequently these periods are preceded by excitement. The mammary glands become enlarged, and the disposition is somewhat changed. As soon as the ova have become matured the female accepts the male. The bitch may usually be allowed her own time for accepting the male. Dogs "*in coitu*" must not be forcibly separated.

The time of being in "heat" extends over about three weeks, and during this time the bitch must be separated from all other dogs except the one chosen.

It is necessary that the brood bitch be given the greatest care, as her health, temper and occupation influence her offspring. The mother and fetus being so closely connected, it follows that the fetus must influence the mother, which explains in some cases why members of litters may resemble previous sires. "Reversion" or "atavism" implies resemblance to a previous sire.

Mating.—In considering this, both animals must be selected carefully. The less closely animals are connected, so long as type can be secured and maintained, the better, and the reasons can be

clearly seen. Good results cannot be obtained from two extremes. Dogs deficient in health and strength should not be used in a stud. Frequently a show bitch or dog is a poor breeder, while a homely one, strongly made and vigorous, will produce puppies much superior to herself.

The Care of a Stud Dog.—In choosing the dog to mate with the bitch his condition must be considered, for it may have a marked effect on the constitution of his offspring. Of such dogs the greatest care must be taken. His food must be nutritious and strengthening, such as eggs, broths, and even cod-liver oil and phosphates. He should have periods of sexual rest to enable him to recuperate, free from excitement.

The Care of the Brood Bitch.—She should be wholly matured. Bitches when too fleshy are not able to conceive. When in "heat" the bitch must have less exercise than usual, avoid accidents, and her food must be less stimulating.

Treatment of the Bitch after Conception.—Is greatly to be considered, and it must be remembered that there are several young coming to life at the expense of one organism.

Increase in size is seldom noticed before the fourth or fifth week of gestation. The whole period of gestation extends over nine weeks or sixty days. The last three weeks are of great importance. Exercise should be cut down, and the bitch should be kept quiet. Ventilation is an important point, life out-of-doors being essential. Preparations should be made for whelping. All vermin and dirt should be removed from the mother by washing. Matters should be so regulated that the puppies come in summer or spring. At this time the bitch has an inclination to retire, and should be allowed a separate kennel, outside, and away from all other dogs. Porridge and milk are useful in opening the bowels; but if the bowels are confined, castor-oil is a remedy. Medicine should be avoided. A stall or loose box in a stable, with straw in one corner, should be provided. Beneath the straw should be placed a piece of clean carpet which has been disinfected. Only those whom the bitch likes should approach her at this time. The temperature should not be lower than 68. The mother cleans the puppies thoroughly as soon as they appear, although the bedding and herself may be in a very foul condition. So, as soon as the puppies are all born, it is wise to renew the bed, using some disinfectant, and to sponge off the bitch with warm water, adding a few drops of carbolic acid, and dry well with cloths. It is well to allow the puppies to suck as soon as they wish, as it has a beneficial effect upon the bitch. The mother should be encouraged to leave her young, and go out in the fresh air and exercise.

Choice of Puppies.—In a litter all the puppies are not equally vigorous and beautiful. It is wiser to

quickly put out of the way any weak or deformed ones. Ordinarily a bitch cannot well take care of more than four or six puppies, and it would be cruelty to allow her to have a litter of from eight to twelve puppies.

Care of the Brood Bitch after Whelping.—Constipation and diarrhœa must be checked or her milk may be affected. Constipation can be relieved by a rectal injection. A nursing bitch ought to be fed three times a day with most nutritious food. A bitch after whelping grows thinner, and, losing her coat, may have eczema.

Weaning Puppies.—A bitch can seldom feed her puppies more than four or five weeks, and should be aided in her duties after the third week. The only practical substitute is cow's milk, about one-half water for the first two days, and gradually strengthened to full strength. Soon the young dogs can eat boiled rice and oatmeal porridge, with stale bread added to their milk. Meat should not be given until puppies are at least one year old, with the exception of bones, which have been well cleaned. These may be given for the purpose of strengthening their teeth.

PART II.—THE DOG IN DISEASE.

Fevers.—The disease known as fever is indicated by an elevation of temperature, and the symptoms are: rapid pulse, perspiration and diminished excretion.

The Pulse—This is found in the under part of the back leg of the dog, near the body, although frequently the pulse can be felt through the chest wall. If the dog is of an excitable nature he must be quieted when the pulse is taken. At birth it is very rapid, being from 130 to 160; after one year, from 70 to 90.

It is difficult to regulate the size of a dose of medicine for a dog; but for a full-grown St. Bernard it should be the same as for an adult human being; and for small dogs it should be about the same as for a child. For puppies the less medicine the better. The giving of medicine is sometimes very difficult, and the easiest way is as follows:

Put the animal in a corner, open the mouth with the fingers, press the jaws apart, pouring the medicine, if a liquid, from a spoon down the throat, as far back as possible. To prevent him spitting it out, hold his head up high until he is compelled to swallow it. Pills are usually easily given. Frequently medicine can be given by putting it in the food or drinking water. After administering any dose the dog should be petted and encouraged, so that he will not dread it the next time he takes it.

Diet and Care of the Sick.—Dogs are usually very wise in the knowledge of their stomachs, refusing to eat when the digestion is disordered. When too sick to care for his regular food, broths, milk, eggs and rice in various forms may be used; but if the dog gets so very ill that he refuses to eat anything, there should be some very strong broth prepared, and give a spoonful of this with a few drops of wine, or some other stimulant, every hour to keep up strength until he is better.

Disinfection.—To prevent disease an animal must be kept sweet and clean and free from vermin. Good preparations to use are "sanitas sawdust" and "creosin."

Respiratory Diseases.—All these diseases, especially those having acute inflammation, are much alike. They are frequently caused by exposure to cold, changes in temperature, or sleeping in cold, damp kennels. Draughts must absolutely be avoided. Digitalis and alcoholic stimulants in small doses are found to be useful for a weak heart; for a dog's strength must be maintained at all costs.

Influenza.—This disease is known also by the name of epizootic, and is an inflammation of the mucous membrane of the head, sometimes ending in pneumonia. The symptoms are sneezing, dryness and burning, high temperature and prostration; the eyes are affected and a watery substance comes from the nose and eyes. Quinine with bromide potassium may be used at the beginning. If depressed, give stimulants.

Acute Laryngitis.—This may result from a cold or tightening of the chain about a dog's neck. Symptoms are, difficulty in swallowing, change in the voice of the dog, and a husky cough. The bowels must be kept open, and the affected parts be irritated by painting over with turpentine or coal oil.

Bronchitis.—This is an inflammation of the mucous membrane of the bronchial tubes. Symptoms are swallowing and dryness of the lining of the tubes with mucus discharge. The dog cannot expectorate, as in the case of man, but frequently vomits, which expels the discharge; other symptoms are a cough and catarrh of the eyes and nose. At the beginning give twenty grains sulphate of zinc; if not effective, follow by two to four drams of wine of ipecacuanha. With a dry cough one can choose from the following remedies: viz., ipecacuanha, ammonia, spirits of chloroform, paregoric and squills. When the acute stage has passed Nuxvomica may be used. When a dog has become enfeebled by disease he may be allowed a small amount of alcoholic stimulants.

Pneumonia.—This is an inflammation of one or both lobes of the lungs. May be caused by wet-

ting, cold, etc. It is a disease that carries off a large number of dogs, and the patient's vitality is the main chance for recovery. The symptoms are troubled breathing, red eyes, dry nose, difficulty in lying down, on account of an attempt to keep his head level. This disease is usually brought on with a chill, the pulse is rapid, and the temperature may be as high as 106° F. When the dog coughs up mucus colored with blood, pneumonia is clearly the disease. An excellent thing is to make a close-fitting jacket which covers the chest, absorbs the moisture from the dog's skin, and protects it from change in temperature. Blistering is never necessary. The temperature of the surroundings should not exceed 60°. The food must be light and of largely a fluid nature. If the pulse is very rapid, aconite may be given. Give the dog plenty of water and buttermilk, if he will drink it. At night, if restless, give fifteen grains of Dover's powder. Give the same quantity of bromide potassium. Whisky and brandy given with eggnog are very useful. If the heart should become weak five drops of the tincture of digitalis should be given for a dog of medium size.

Asthma.—This is not common in puppies, but frequently comes to pet dogs, who are overfed and not allowed much exercise. Symptoms, wheezy respiration and difficulty in breathing. Tar may be burned to the dog's relief sometimes.

To relieve the liver and digestive organs give a compound cathartic pill at night with Epsom salts in the morning. Iodide potassium may produce a cure. From one to five grains should be given.

DISEASES OF THE BLOOD.

Anaemia.—Is an impoverished condition of the blood, and may be caused by damp kennels and ill feeding. Make the surroundings as hygienic as possible, and feed the most nutritious food. Muriated tincture of iron, cod-liver oil, and citrate of iron may be useful.

DISEASES OF THE MOUTH.

Warts may be cut, but the result is apt to be injurious. Nitrate of silver is the safest remedy; also strong acetic acid.

Teeth.—Bones, crusts and other hard food help to keep the teeth clean. It is frequently necessary to use a brush in order to keep the tartar from the teeth. Gums, if neglected, become softened and abscesses may appear. When this is the case some of the teeth may require to be removed, or the gums to be lanced. If the teeth break off, leaving stumps that may cause trouble later on, the roots should be extracted. In puppies, if the first teeth do not drop out in proper season, they must be removed to make way for the second set.

Disorders of the Digestive Organs.—Vomiting is the easiest way for a dog to save himself from indigestion, and proves that the food has not suited him. Eating grass is a dog's remedy for indigestion. If a dog's appetite is capricious, it is best to find if there is any cause for it. Organic disease, or worms in the feces, are sure indications of his internal condition; and the feces or stools should never be so stiff as to cause him to strain to pass them, nor so fluid as to run in a stream.

Diarrhea.—Is due either to an excess of or unsuitable food. If it cannot be controlled by dieting and rest, easily digested food must be given. Opiates and astringents must only be used after a good dose of castor-oil.

Obstruction.—May be caused by continued constipation and is serious. Try enemas of warm soap-suds and castor-oil, kneading the abdomen if necessary.

Constipation.—Dogs infrequently exercised are liable to this. Boiled liver is excellent, combined with exercise, or Epsom salts in the morning. Coarse flour should be used in the making of bread for dogs.

Colic.—May be caused by damp, wet and worms, and is detected by symptoms of uneasiness, moaning, sharp cries, arched back and difficulty in walking. Give castor-oil with twenty drops of laudanum. If the bowels do not move, an enema is necessary; and if not successful, try twenty drops of chlorodyne, or a dram of spirits of chloroform, with the same amount of aromatic spirits of ammonia, diluted with water.

Inflammation of the Digestive Organs.—Diseases of the alimentary canal are gastritis, or the inflammation of the stomach; enteritis, or inflammation of the small intestines; dysentery, or inflammation of the large intestines; and peritonitis, or inflammation of the serous covering of the abdominal walls. *Symptoms.*—Catarrh and a dry state of the mucous membrane. Caused by unhealthy surroundings; damp and cold, unsuitable food and nervous shock. First vomiting; change of expression and attitude, diarrhea or constipation, sensitiveness of the abdominal walls, elevated temperature, quickened pulse and respiration. In advanced cases, delirium and stupor. A dog must have absolute quiet, rest of body and mind, and his strength kept up by either suitable feeding or stimulants.

The symptoms of gastritis are vomiting first, tenderness and pain. There is an inclination to lie stretched out on the belly.

Enteritis is not always clearly distinguished, but calls the attention to the intestines. Dysentery, if not severe, resembles diarrhea.

Peritonitis.—Is marked by constipation, with great pain and tenderness, and a rapid pulse. Dogs should be separated from other dogs, and given a comfortable bed. Food should be given in

small quantities, but frequently, beginning with liquid, going to more solid food. Lime-water is a good thing to add to the drinking-water or milk which the dog drinks. To start vomiting, give small pieces of ice or very small doses of carbolic acid, one-half to one grain, in a little ice-water.

Dysentery.—May be treated much the same as diarrhea. In the former, however, it is very beneficial to inject boiled starch, with from twenty to forty drops of laudanum, and a dessert-spoonful of listerine, retaining the whole within the bowels by holding the hand covered with a soft cloth against the anus for ten minutes. It is considered wise in this case, as well as in diarrhea, to use castor-oil or silver-buckthorn. Make sure that the bowels are free from any offensive matter.

Dysentery become Chronic.—Is most obstinate to cure. In this case, use small doses of ipecacuanha, or three to eight drops of wine. If constipation exists, with either gastritis or enteritis, use enemas. While the symptoms are acute in peritonitis, opium is most valuable. Hot applications are also useful. If the heart fails, stimulants should be given; milk, egg and brandy making a good preparation. For a time the dog should be fed three times a day, but in small quantities, and the greatest care must be taken of him in exercising, housing, etc.

Disease of the Liver.—Hepatitis, or inflammation of the liver, is hard to diagnose.

Symptoms.—Indigestion, pain, bad breath, and lying on the chest or stomach, and characteristic stools. Attention should be called especially to the diet and surroundings.

Diseases around the Anus.—Prolapse of the rectum. Extrusion of a portion of the gut. The first thing is to put back the gut as soon as possible. It should be washed clean with an antiseptic solution of weak carbolic acid; then press gently back, the hind part of the body being raised, and some cold water injected, and retained for a short time. If, after this, the intestines still protrude, a truss must be used, and the dog not allowed to exercise.

Piles.—These occur frequently in old dogs, especially if the circulation is weak. If the dog strains, licks the anus, and drags the hind parts, it should lead one to suspect piles. If the piles are internal (if external, a surgeon will be necessary), soft food, such as oatmeal or porridge, should be given, to which add laxatives, one of the best of which is sulphur, which can be mixed up with the food. External piles may be washed with a combination of tannic acid, glycerine, laudanum, and water. This failing, surgical measures will be necessary.

Retention of Urine.—May ensue from swelling of the mucous membrane of the urethra, enlargement of the prostate glands, or swelling of this part from sexual excitement or injury. Usually, quiet will help this; but if not, and the bladder is enlarged, a warm bath should be taken, the dog being made to

sit on his haunches in a tub with water as hot as it can be borne, to reach above his loins, for twenty minutes or so.

DISEASES OF THE GENITAL ORGANS.

Balanitis or Inflammation of the Sheath Covering the Penis.—The sheath becomes swollen and sensitive, and soon a muco-purulent discharge is noticed. The sheath must be kept clean by frequent washing with warm water; and if this is not sufficient, use such soothing solutions as tannic acid, sulphate of zinc, acetate of lead, and insert a little surgeon's lint, dipped in the solution, within the sheath for twenty minutes.

Complications Attending Parturition.—These occur only when the bitch has been improperly attended during gestation, or when the sire was too large for the dam, and the young resemble him in size. Regular examinations of the bitch may be made by insertion of the finger into the vagina, but the fewer examinations the better. However, if it becomes necessary the hands must be thoroughly washed, disinfected, and the examining finger anointed with carbolyzed oil or vaseline. In whelping for the first time a bitch is likely to be longer in giving birth to the first puppy; but so long as there is no lack of muscular power in the uterus, no discharge or symptom of a dead puppy, patience is all that is necessary.

Malpresentations.—Occur very seldom. If the effort of the bitch is not sufficient to remove the puppy, the belly may be pressed and some parts of it brought within reach of the finger. If it should be dead the sooner it is removed the better.

Use of Instruments.—Is not to be desired. Ergot of rye is exceedingly useful to increase the uterine contractions.

After a Bitch Whelps.—Cleanse her with a weak solution of carbolic acid, dry her well and put the puppies at her breast. Should the mammary glands be swollen or caked, they must be milked, softening with warm oil. To harden the nipples, wash two days before whelping with alcohol.

DISEASES OF THE EAR.

Canker.—External.—This is an inflammation of the inner part of the outside ear, and if not stopped may extend into the inside. The dog shakes his head, scratches his ear, and a kind of husk appears, which dries and forms into scabs. Wet, cold, and improper feeding cause this. The first thing is to thoroughly clean the ear, bathing with warm water and lard. Also, use a syringe to clean the ear, but no probes; pointed instruments or cold liquids must never be used. Increase the exercise and restrict the diet. Well-boiled vegetables, carrots, turnips, parsnips, etc., make a good diet.

Make a thin muslin cap for the dog to wear over his head to prevent him shaking his ears. Touch

the sore every other day with tincture of muriate of iron, and apply iodoform ointment two or three times a day.

Ophthalmia.—Is simple inflammation caused by some foreign substance getting into the eye, a blow or scratch, and is frequently found in distemper and skin diseases. The animal has a watery appearance about his eyes, winking and showing a strong dislike for light. If the inflammation is not reduced, a whitish film forms, followed by ulceration. Warm water might be allowed to trickle through a sponge into the eyes, and a hot fomentation medicated with belladonna laid on the eyes. A solution of nitrate of silver, of from ten to twenty grains to the ounce of water, may be applied with a camel's-hair brush.

Hydrophobia.—This is frequently mistaken for a fit, and many valuable dogs have been killed through ignorance.

It is a disease of the nervous system, and the cause is a poison in the saliva.

Symptoms.—First quietness, shyness, and an inclination to get away; but sooner or later he begins to show excitement. He is either more or less affectionate than usual, and the appetite is abnormal, the animal swallowing everything that comes in his way. The voice is changed to a short, quick bark, which ends in a howl or moan. In the excitable state he will roam over the country at a jog-trot, head down, tongue out, but not of necessity frothing at the mouth, yet snapping at anything that comes in his way. This is an unconscious action. He will not eat, as a rule, nor touch water.

Fits.—A dog shows no premonitory symptoms except a slight quivering of the muscles, then he falls upon his side, losing consciousness. The limbs work violently, the eyes set, and there is frothing at the mouth. There is no danger from him so long as you do not attempt to touch him, and the best treatment is to put cold water on his head and keep the body warm. Bromide is also good.

Meningitis.—It may be either spinal, cerebral or both. The cause is usually extreme heat or cold, or the result of blows. The dog shows extreme sensitiveness, followed by a stupor; and in severe cases by paralysis of the rear end of the body. The bowels should be kept open, the fever reduced by cold applications on the head, and the dog should be allowed to lie in a secluded corner on a rug or piece of carpet in a cool temperature and be left alone as much as possible. The strength must be kept up at any rate; and if the dog refuses to eat oatmeal, porridge, etc., strong broth must be given in small doses every hour or two.

Skin Diseases.—Mange is divided into two classes, follicular mange and sarcoptic mange.

Follicular Mange.—Though not as troublesome, causes inflammation, and is accompanied by a fetid odor.

Sarcoptic Mange.—Is caused by the female vermin boring into the skin, laying eggs, which, when hatched, send out young in every direction. This is very contagious, more so than the former, and causes the hair to come off.

Eczema.—This is a disease of the skin which is commonly thought to be mange. One kind comes at the beginning of hot weather, and stays until the frost comes. It can be cured, but is very persistent in returning each year. Blood medicines are of real assistance, the trouble being within; and internal remedies should be used rather than external.

A long-haired dog should be clipped in summer to prevent this eczema. Scabs may be softened by washing in water containing a little washing soda. Powdered sulphur dusted through the hair is soothing.

The bowels should be kept open, and cooling foods used. Sulphur may also be put in the drinking-water, and very little meat should be given.

To allay the irritation the following may be used: Sodium carbonate, or bi-carbonate, or borax, of the strength of about ten grains to the ounce of water.

To increase the growth of hair more blood and energy are necessary, so that friction and stimulating applications are to be recommended; such as cocoanut oil, or a combination of this oil with coal oil and olive oil in equal parts.

Worms.—Puppies are especially subject to this, and death is not an uncommon result. Round worms are most to be feared.

Symptoms.—Restless, disturbed slumber, cough, unpleasant breath, nausea, diarrhea, caked nose, the animal swallowing foreign substances, pallid and bloated appearance of the abdomen while thin elsewhere.

For the tape-worm use areca, kousoo, pomegranate, turpentine and oil-male fern.

For the round worm use worm-seed oil, worm-wood, calomel, kousoo, hellebore. Pink and senna is an effective remedy.

Fleas.—Constant vigilance is the only way to keep dogs free from fleas. If in small quantities, they can be caught and killed, or the animal may be dusted by means of a little bellows with Persian powder. Wash the dog in carbolic soap.

Lice.—Can be as easily destroyed as fleas. Comb-ing of the coat will also greatly help.

Rheumatism.—This often appears in the joints of the legs. The dog shows a desire to lie quietly in a warm spot and walks with a limp. Keep the animal in a warm, dry room; open the bowels, and give rhux tox and iodide of potash. Lime-water should be added to the drinking-water, and nitrate of potash when fever exists.

Distemper.—This is a disease which it is much better for the dog to have when a puppy than when

he is grown. It is usually caused by a cold, and it is contagious.

In the early stages the symptoms are, dullness, loss of appetite, sneezing, chills, fever, undue moisture of nose, congestion of the eyes, nausea, cough, and vomiting, with a desire to lie in a warm place. These are followed by muco-purulent discharge from the eyes and nose, labored respiration, constipation or obstinate diarrhea. The animal should be given a warm, dry place and hygienic conditions strictly observed. Avoid draughts. The bedding should be changed daily, and the apartment disinfected two or three times a week. Feed on easily digested food, such as, beef-tea, mutton-broth, etc., and keep cold water at all times within reach of the animal. If he is constipated, give warm water and glycerine

and perhaps a dose of castor-oil. Should the bowels become too loose, feed on farinaceous food, arrow-root or corn-starch with well-boiled milk.

The eyes and nose should be bathed to keep them free from mucus, and to keep down the inflammation, and the nose must be kept clear of any obstructions.

Sprains or Bruises.—The treatment consists in rest, cooling lotions, and iced cloths. If inflammation has begun, hot fomentations, medicated with belladonna, will be useful.

Fractures and Dislocations.—These should be attended to at once. The part of the body affected should be bound up. If a fracture, it should be set; if a dislocation, reduced, and the dog kept as quiet as possible.

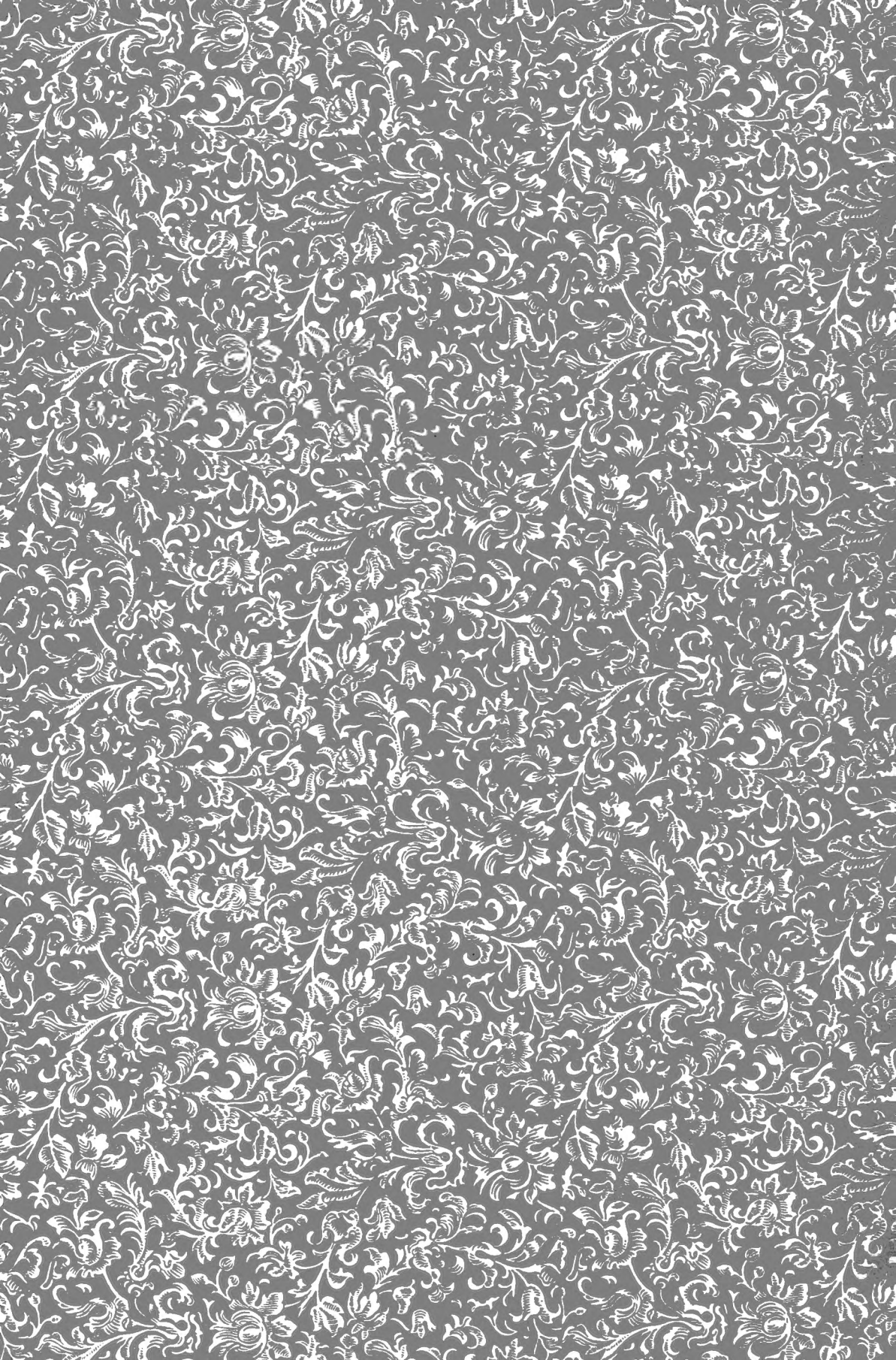


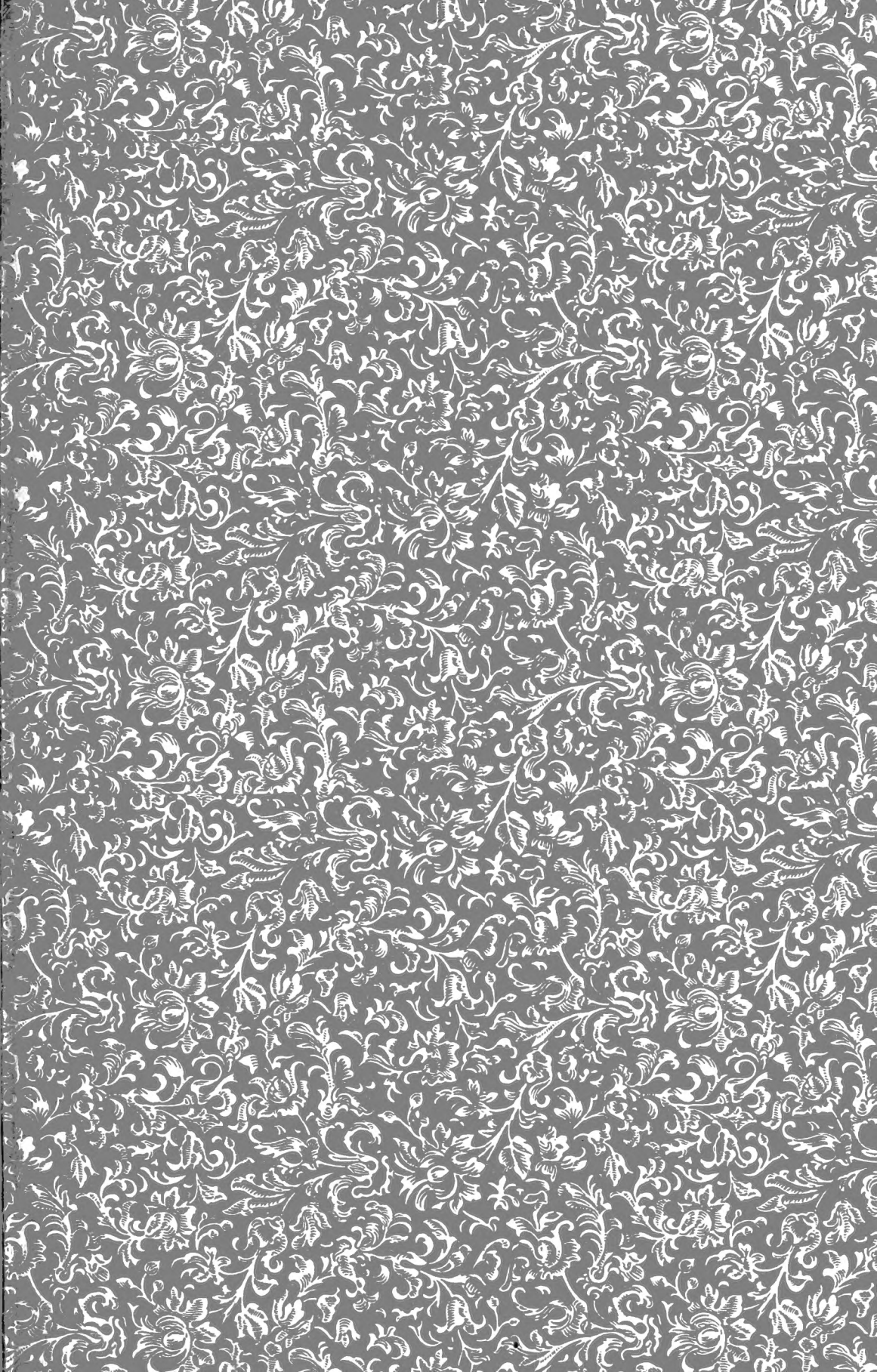
THE DEER HOUND

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